

# CEQA DRAINAGE STUDY



**RANCHO CIELO ESTATES  
PARCEL 'VC'  
MARCH 2011**

**COUNTY OF SAN DIEGO  
TM 5440 - EA LOG NO. 86-06-026B  
LOT 109, TM 4229-4, Map No.12764**

Prepared For: Rancho Cielo Estates

Prepared By: Fuscoe Engineering, Inc.

Job Number: 02711-001-01



**Preliminary Drainage Study**  
**For**  
**Rancho Cielo Parcel 'VC'**  
**County of San Diego, CA**

Prepared under the Responsible Charge of:

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EXP: 03-31-12

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Map Pocket:   Existing 100-Year Hydrology Exhibit  
                  Proposed 100-Year Hydrology Exhibit

## REFERENCES

County Hydrology Manual (2003)

County of San Diego Standard Urban Stormwater Mitigation Plan (2011)

County of San Diego Drainage Design Manual (2005)

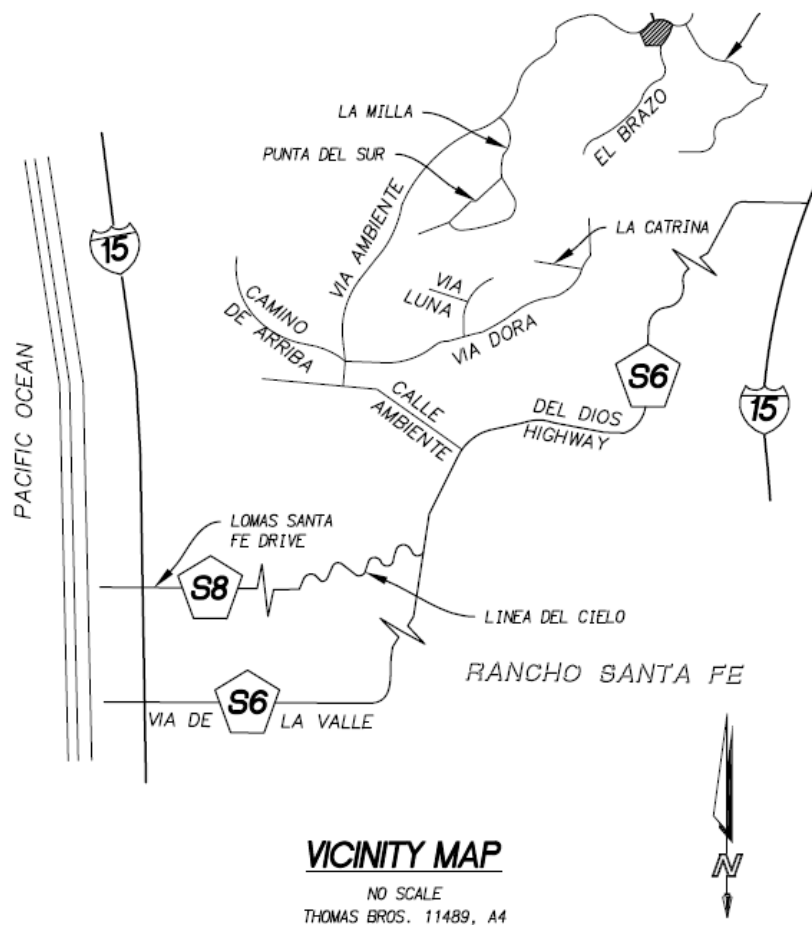
## INTRODUCTION

### **PURPOSE**

This Preliminary Drainage Study pertains to the proposed development of Rancho Cielo Parcel 'VC' to the west of the intersection of Via Ambiente and El Brazo. Its purpose is to present the design of the drainage facilities of the proposed project located in the County of San Diego, CA.

### **PROJECT DESCRIPTION**

The proposed development of Rancho Cielo Parcel 'VC' consists of a one-lot condominium project including eleven residential units. The lot will be designated for residential uses with a portion of the lot designated as open space. The project area is located along Via Ambiente in the community of Rancho Cielo, to the north of Rancho Santa Fe, CA. Refer to the following Vicinity Map.



The project site is 5.59 acres. The existing site is characterized by a hilltop surrounded by steep slopes. Via Ambiente forms the northerly boundary of the project and El Brazo forms

the easterly boundary. Low density residential development exists along a portion of the westerly and southerly project boundary, while the remainder of the adjacent area is undeveloped. The proposed project will construct a driveway on Via Ambiente west of the intersection with El Brazo. The residential units will be accessed via a private interior street on a cul-de-sac.

## **BASIN DESCRIPTION**

### **Existing Conditions:**

Due to the hilltop nature of the site, runoff from the project site splits into several drainage basins.

Basin 1 encompasses the majority of the southern portions of the site. This basin drains to a canyon onsite which drains to the south, conveying flows to the San Dieguito River.

Basin 2 consists of the easterly slope. Runoff from this basin is collected by an existing brow ditch leading to a Type 'F' inlet. This runoff is collected and piped through the existing 18" RCP storm drain and discharges east of El Brazo, a private street. These existing drainage facilities were constructed per TM 4229-2. The runoff then runs down a canyon east of El Brazo and eventually leads to the San Dieguito River. Refer to the Existing Hydrology Map included in the appendix.

Basin 3 is located along the northerly frontage of the project along Via Ambiente. Consisting of street drainage on Via Ambiente and runoff from the northerly slope, the basin leads to an existing catch basin near the intersection with El Brazo. The catch basin connects to an underground storm drain system which outlets to a canyon to the east of the intersection of Via Ambiente and El Brazo. This canyon flows southwest to a confluence with the San Dieguito River.

Please refer to the "Existing 100-Year Hydrology Exhibit" for a graphical depiction of these drainage patterns.

### **Proposed Conditions:**

The proposed development will maintain the existing drainage patterns. The site will continue to be split among three drainage basins that all drain to San Dieguito River. Although the areas of the proposed drainage basins will not match the existing conditions exactly, there will be no diversion greater than one acre between basins.

The majority of the proposed development will occur in Basin 1, consisting of the new cul-de-sac and pads. Curb inlets near the project entrance will convey runoff to an extended detention/hydromodification Integrated Management Practice (IMP). The basin will discharge to the existing canyon within Basin 1.

The rest of the development will continue to drain to the existing storm drain facilities that outlet southeast of the intersection of Via Ambiente and El Brazo, and eventually lead to the San Dieguito River.

Please refer to the "Proposed 100-Year Hydrology Exhibit" for a graphical depiction of these drainage patterns.

## METHODOLOGY

### RUNOFF CALCULATIONS

The design criteria, as found in the County of San Diego Department of Public Works Flood Control Division Hydrology Manual, specifies the design runoff conditions within the San Diego County Flood Control District will be based on the 100-year storm frequency, as follows:

- 1.) Design for areas over 1 square mile will be based on the 100-year frequency storm.
- 2.) For areas under 1 square mile –
  - a. The storm drain system shall be designed so that the combination of storm drain system capacity and overflow both inside and outside the right of way will be able to carry the 100 year frequency storm without damaging adjacent existing buildings or potential building sites.
  - b. The storm drain system shall be designed so that the combination of storm drain system capacity and allowable street overflow will be able to carry the 50 year frequency storm without damaging adjacent property.
  - c. Where a storm drain is required under headings 1 or 2 above, then as a minimum, the drain shall be designed to carry the 10-year frequency storm.
- 3.) Sump areas are to be designed for a sump capacity or outfall of a 100-year frequency storm.

Runoff produced on the project site will be calculated for the 100-year storm event using the methodology outlined in the San Diego County Hydrology Manual. Runoff will be calculated using the Rational Method, which is given by the following equation:

$$Q = C \times I \times A$$

Where:

Q = Flow rate in cubic feet per second (cfs)

C = Runoff coefficient

I = Rainfall Intensity in inches per hour (in/hr)

A = Drainage basin area in acres, (ac)

Soil Type – Hydrologic soil group D was assumed for all areas as this is the prevalent soil group near the project site as can be seen in the Soil Hydrologic Groups map

provided in the appendix. Group D soils have very slow infiltration rates when thoroughly wetted. Consisting chiefly of clay soils with a high swelling potential, soils with a high permanent water table, soils with clay pan or clay layer at or near the surface, and shallow soils over nearly impervious materials, Group D soils have a very slow rate of water transmission.

**Runoff Coefficient** – In accordance with the County of San Diego standards, pervious areas were assigned a runoff coefficient of  $C = 0.35$ , based on the type D soils. Where a sub-basin consists of a mixture of pervious and impervious surfaces, a weighted runoff coefficient was calculated using the following equation, based on Section 3.1.2 of the manual:

$$C = 0.90 \times (\% \text{ Impervious}) + 0.35 \times (1 - \% \text{ Impervious})$$

A summary of the runoff coefficient calculations are contained in the following table.

Rainfall intensity was calculated using the following equation, which is given in the Manual:

$$I = 7.44 \times P_6 \times (T_c^{-0.645})$$

Where:

$I$  = Rainfall Intensity in inches per hour (in/hr)

$P_6$  = Rainfall in inches for the 6-hour storm event

$T_c$  = Time of concentration in minutes

Time of concentration was calculated for overland flow areas (sheet drainage) using the equation developed by the Federal Aviation Administration, which is given as:

$$T_c = [1.8 \times (1.1 - C) \times (L^{1/2})] / (S^{1/3})$$

Where:

$T_c$  = Time of concentration in minutes

$C$  = Runoff coefficient

$L$  = Length of travel of runoff in feet

$S$  = Slope in percent

The minimum time of concentration used for runoff calculations was based on Table 3-2 of the Manual. Relevant excerpts from the Manual are given in the appendix.

Time of travel in the drain and drainage channels was calculated using the Manning equation. For HDPE storm drains, a Manning "n" value of 0.012 was selected, while for RCP storm drains a Manning "n" value of 0.013 was used. For brow ditches, a Manning "n" of 0.015 was used.

To perform a node-link study, the total watershed area is divided into sub-areas which discharge at designated nodes.

The procedure for the sub-area summation model is as follows:

- (1) Subdivide the watershed into an initial sub-area (generally 1 lot) and subsequent sub-areas, which are generally less than 10 acres in size. Assign upstream and downstream node numbers to each sub-area.
- (2) Estimate an initial  $T_c$  by using the appropriate nomograph or overland flow velocity estimation.
- (3) Using the initial  $T_c$ , determine the corresponding values of  $I$ . Then  $Q = CIA$ .
- (4) Using  $Q$ , estimate the travel time between this node and the next by Manning's equation as applied to particular channel or conduit linking the two nodes. Then, repeat the calculation for  $Q$  based on the revised intensity (which is a function of the revised time of concentration)

The nodes are joined together by links, which may be street gutter flows, drainage swales, drainage ditches, pipe flow, or various channel flows. The AES-2004a computer sub-area menu is as follows:

#### SUBAREA HYDROLOGIC PROCESS

1. Confluence analysis at node.
2. Initial sub-area analysis (including time of concentration calculation).
3. Pipe flow travel time (computer estimated).
4. Pipe flow travel time (user specified).
5. Trapezoidal channel travel time.
6. Street flow analysis through sub-area.
7. User-specified information at node.
8. Addition of sub-area runoff to main line.
9. V-gutter flow through area.
10. Copy main stream data to memory bank
11. Confluence main stream data with a memory bank
12. Clear a memory bank

At the confluence point of two or more basins, the following procedure is used to combine peak flow rates to account for differences in the basin's times of concentration. This adjustment is based on the assumption that each basin's hydrographs are triangular in shape.

- (1). If the collection streams have the same times of concentration, then the  $Q$  values are directly summed,

$$Q_p = Q_a + Q_b; T_p = T_a = T_b$$

(2). If the collection streams have different times of concentration, the smaller of the tributary Q values may be adjusted as follows:

(i). The most frequent case is where the collection stream with the longer time of concentration has the larger Q. The smaller Q value is adjusted by a ratio of rainfall intensities.

$$Q_p = Q_b + Q_a (I_b/I_a); T_p = T_a$$

(ii). In some cases, the collection stream with the shorter time of concentration has the larger Q. Then the smaller Q is adjusted by a ratio of the T values.

$$Q_p = Q_b + Q_a (T_b/T_a); T_p = T_b$$

### DETENTION BASIN SIZING

To mitigate for the increased peak flows due to the development, a detention basin is proposed. The required volumes of the detention basin was determined as follows:

- 1) The inflow hydrograph for the peak discharge of the 100-year 6-hour storm event was calculated using the Rational Method Hydrograph program developed by Rick Engineering.
- 2) The maximum outflow from the detention basin was determined based on the allowable downstream peak discharge.
- 3) Determine Stage/Storage/Discharge table based on basin geometry and proposed outlet structure.
- 4) The outflow hydrograph was developed through the use of the Hydraulic Elements II Retarding Basin Routing version 10.0 developed by AES.

Calculations and results of the detention basin sizing can be found in Appendix 3.

### DETENTION BASIN OUTLET DESIGN

The detention basin outlet consists of round orifice openings in the side of a grated catch basin. The size and elevation of the orifice openings and the elevation of the grate inlet have been designed such that the 100-year water surface elevation will not reach the grate inlet, and the orifice openings will release runoff at rates at or below the existing condition peak flows. The grate inlets will serve as emergency overflows in the event of the clogging of one or more of the orifice openings. To determine the rate of release for various depths within the detention basin, orifice calculations were performed. Flow discharged through an orifice was calculated using the orifice equation, given as:

$$Q_o = C_o \times A_o \times (2 \times g \times H_o)^{1/2}$$

Where:

$Q_o$  = Flow rate through the orifice in cfs

$C_o$  = Coefficient accounting for entrance loss to the orifice (0.6 assumed)

$A_o$  = Area of the orifice in square feet

$g$  = Gravitational acceleration equal to 32.2 feet per second per second

$H_o$  = Head acting on the orifice in feet

Results of these calculations can be found in the appendix.

## CALCULATIONS/RESULTS

### EXISTING CONDITIONS

Calculations were performed on the existing drainage patterns on the project site to determine the current discharge during a storm event. These calculations were performed based on the 100-year 6 hour storm event. The following table summarizes the peak discharge for each storm event at the basin discharge points. Please refer to the Existing 100-Year Hydrology Exhibit, and the hydrology calculations can be found in Appendix 2.

Basin	Area (ac)	100-Year Storm	
		Q (cfs)	$T_c$ (min)
1	3.7	9	6.5
2	1.1	3	5.9
3	1.0	4	4.6

### PROPOSED CONDITIONS

To analyze the effects of the proposed development on the downstream channels and storm drain system, an analysis of the proposed storm drain system was performed. These calculations were also performed based on the 100-year 6 hour storm event. The following table lists the peak discharge for each storm event at the basin discharge points. As can be seen in the table, the peak discharge in Basin 1 will increase due to development, while the peak discharge from Basins 2 and 3 will decrease or stay the same. Please refer to the Proposed 100-Year Hydrology Exhibit, and the hydrology calculations can be found in Appendix 2.

Basin	Area (ac)	100-Year Storm	
		Q (cfs)	$T_c$ (min)
1	4.5	11	9.0
2	0.4	1	5.7
3	0.9	4	4.7

The increased discharge from the project site in Basins 1 is due primarily to the increased amount of impervious area. To mitigate this effect, a peak detention basin will be constructed. As described previously, this will be a multi-function basin which will also provide storm water treatment as extended detention basin and hydromodification flow control. Please refer to the Preliminary Hydromodification Management Study and Storm Water Management Plan for further discussion of these aspects of the IMP. The detention basin has been designated as IMP 1.1. The detention basin has been sized to limit the

peak discharge from Basins 1 to pre-development levels for the 100-year storm. The design and functioning of the detention basin will be discussed further in the following section. The following table lists the peak discharges from Basin 1 after accounting for the detentions basin, which is a slight decrease from existing conditions.

Basin	Area (ac)	100-Year Storm	
		Q (cfs)	T <sub>c</sub> (min)
1	4.5	4	9.0

## DETENTION BASIN

To mitigate the increased discharge in Basin 1, a detention basin will be provided (IMP 1.1). IMP 1.1 will collect and detain runoff from Basin 1, and outlet to the canyon to the south. In order to prevent erosion of this hillside, rip rap will be provided at the outlet. The detention basin has been sized so that the existing 100-year peak flow rate will be matched at discharge points of the basins. Thus, the proposed development will not increase the 100-year discharge to adjacent properties.

Post-developed flow at the discharge point of Basin 1, with no detention, has been calculated to be 11 cfs, an increase of 2 cfs over existing conditions. To mitigate this increase, discharge from IMP 1.1 will be limited to a maximum of 0.05 cfs, a decrease of 7.45 cfs. When accounting for detention, the peak flow from Basin 1 will therefore be 3.95 cfs, which is lower than the existing condition.

To provide this level of mitigation, IMP 1.1 has been designed as a 0.72 ac-ft detention basin. The detention basin has 2:1 side slopes and will accept flow from the storm drain system to the northeast. The bottom of the basin is at an elevation of 1150. The basin will discharge through a series of orifice openings, which have been sized for the multi-function nature of the basin. A 1" diameter orifice will be provided at the bottom of the pond and an 8" diameter orifice will be provided at a depth of 5.0'. During the 100-year storm event, the basin will fill to a depth of approximately 3.4 feet. At this depth, the outflow from the basin through the outlet structure will be 0.05 cfs. If the outlet orifices become clogged, an emergency overflow will be provided in the form of a grated catch basin, with a grate elevation of 1057. The emergency overflow will be designed to pass the undetained 100-year peak flow of 7.5 cfs.

Refer to Appendix 3 for detailed detention basin calculations and schematic details of the outlet structures.

## CONCLUSION

The storm drain system for Rancho Cielo Parcel 'VC' has been designed for the 100-year storm event. Due to the impervious areas included in the proposed residential development, discharges from Basin 1 will increase from the existing condition to the proposed condition. A peak detention basin has been provided in this basin to limit the peak discharge to the existing peak discharge before exiting the project site. The

following table summarizes the existing and proposed 100-year peak runoff for the drainage basins within the project site.

Basin	Existing Q(100)	Proposed Q (100)
	(cfs)	(cfs)
1	9	4
2	3	1
3	4	4

For discussions of the hydromodification and storm water quality aspects of the project, please refer to the Preliminary Hydromodification Management Study and the Storm Water Management Plan, respectively.

# **APPENDIX 1**

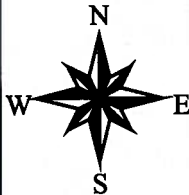
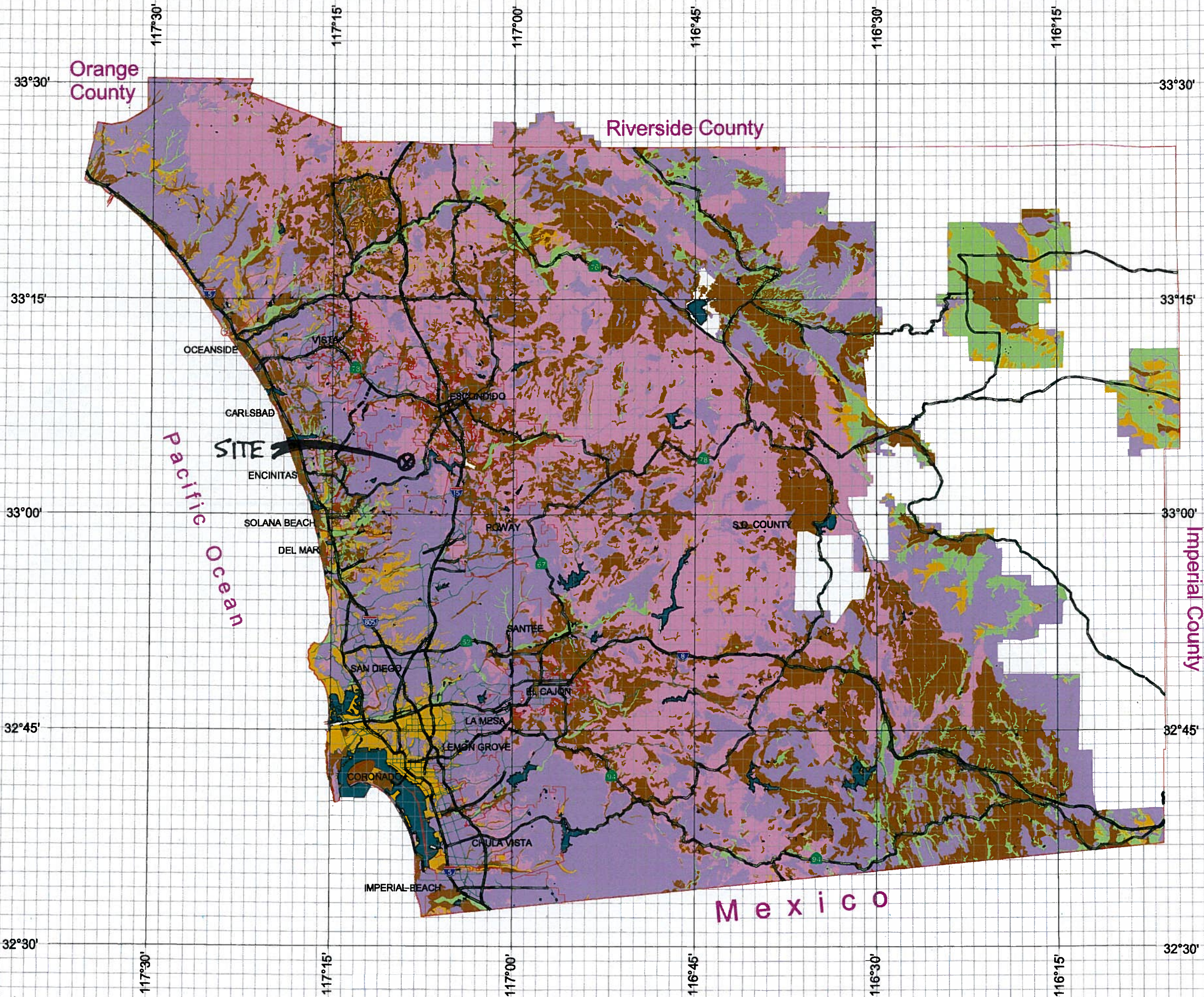
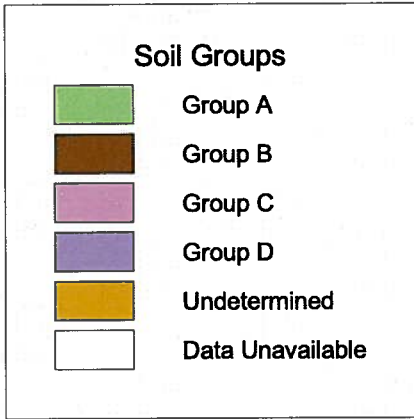
**Excerpts from County Hydrology Manual**

# County of San Diego Hydrology Manual



## Soil Hydrologic Groups

### Legend



3 0 3 Miles

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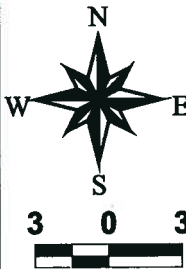
# County of San Diego Hydrology Manual



## Rainfall Isopluvials

### 100 Year Rainfall Event - 6 Hours

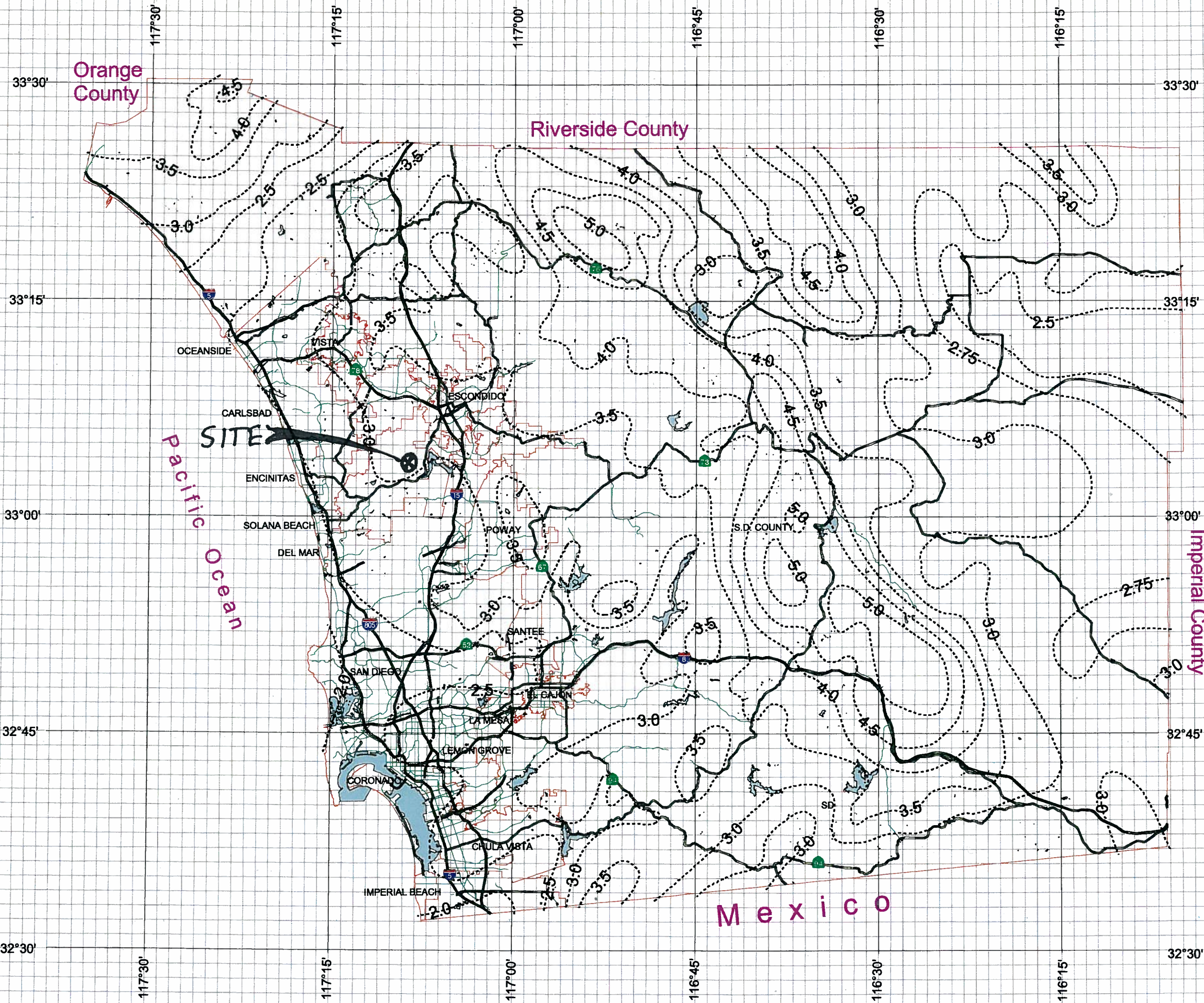
----- Isopluvial (inches)



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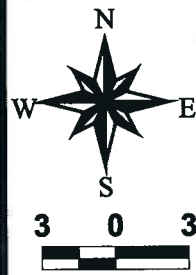
# County of San Diego Hydrology Manual



## Rainfall Isopluvials

### 100 Year Rainfall Event - 24 Hours

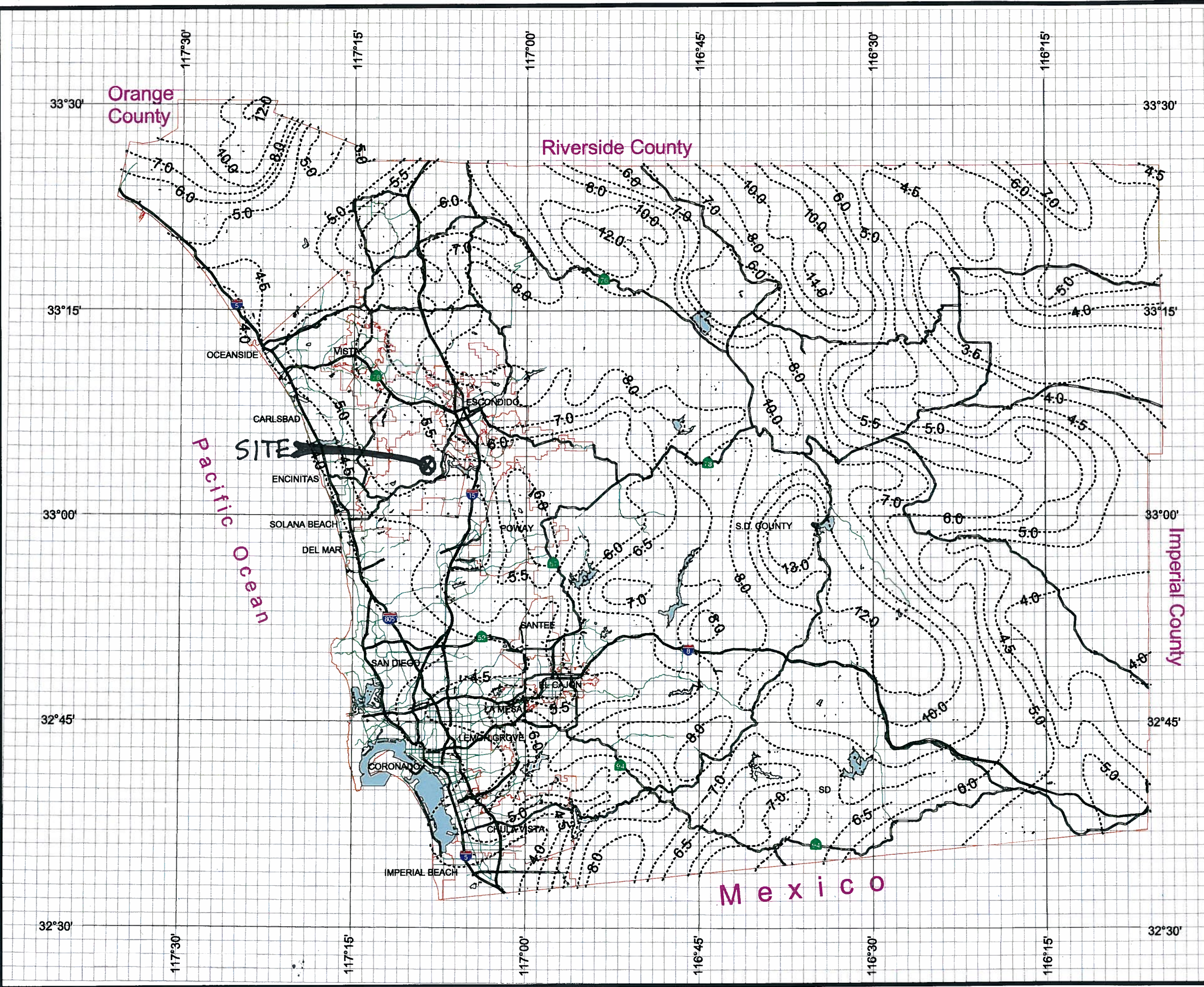
----- Isopluvial (inches)

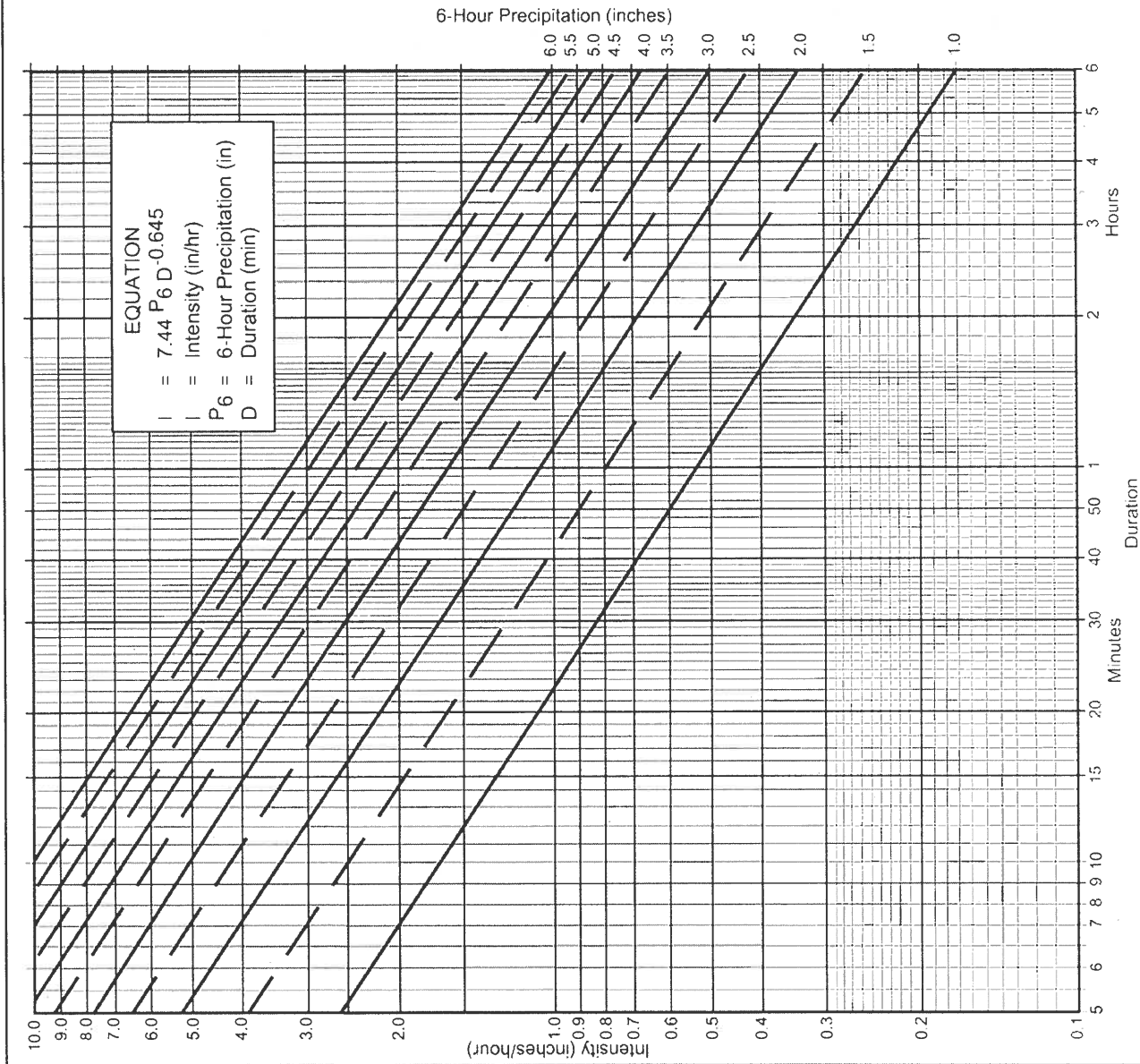


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### Directions for Application:

- From precipitation maps determine 6 hr and 24 hr amounts for the selected frequency. These maps are included in the County Hydrology Manual (10, 50, and 100 yr maps included in the Design and Procedure Manual).
- Adjust 6 hr precipitation (if necessary) so that it is within the range of 45% to 65% of the 24 hr precipitation (not applicable to Desert).
- Plot 6 hr precipitation on the right side of the chart.
- Draw a line through the point parallel to the plotted lines.
- This line is the intensity-duration curve for the location being analyzed.

### Application Form:

- Selected frequency 100 year
- $P_6 = 3.1$  in.,  $P_{24} = 5.3$  in.,  $\frac{P_6}{P_{24}} = 58\%$
- Adjusted  $P_6^{(2)} = 3.1$  in.
- $t_x =$  min.
- $I =$  in./hr.

Note: This chart replaces the Intensity-Duration-Frequency curves used since 1965.

$P_6$	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
Duration											
5	2.63	3.95	5.27	6.59	7.90	9.22	10.54	11.86	13.17	14.49	15.81
7	2.12	3.18	4.24	5.30	6.36	7.42	8.48	9.54	10.60	11.66	12.72
10	1.68	2.53	3.37	4.21	5.05	5.90	6.74	7.58	8.42	9.27	10.11
15	1.30	1.95	2.59	3.24	3.89	4.54	5.19	5.84	6.49	7.13	7.78
20	1.08	1.62	2.15	2.69	3.23	3.77	4.31	4.85	5.39	5.93	6.46
25	0.93	1.40	1.87	2.33	2.80	3.27	3.73	4.20	4.67	5.13	5.60
30	0.83	1.24	1.66	2.07	2.49	2.90	3.32	3.73	4.15	4.56	4.98
40	0.69	1.03	1.38	1.72	2.07	2.41	2.75	3.10	3.45	3.79	4.13
50	0.60	0.90	1.19	1.49	1.79	2.09	2.39	2.69	2.98	3.28	3.58
60	0.53	0.80	1.06	1.33	1.59	1.85	2.12	2.39	2.65	2.92	3.18
90	0.41	0.61	0.82	1.02	1.23	1.43	1.63	1.84	2.04	2.25	2.45
120	0.34	0.51	0.68	0.85	1.02	1.19	1.36	1.53	1.70	1.87	2.04
150	0.29	0.44	0.59	0.73	0.88	1.03	1.18	1.32	1.47	1.62	1.76
180	0.26	0.39	0.52	0.65	0.78	0.91	1.04	1.18	1.31	1.44	1.57
240	0.22	0.33	0.43	0.51	0.65	0.76	0.87	0.98	1.08	1.19	1.30
300	0.19	0.28	0.38	0.47	0.56	0.66	0.75	0.85	0.94	1.03	1.13
360	0.17	0.25	0.33	0.42	0.50	0.58	0.67	0.75	0.84	0.92	1.00

FIGURE

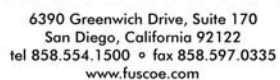
Intensity-Duration Design Chart - Template

# APPENDIX 2

Hydrology Calculations

**100-Year Storm**

**Existing Conditions**



Job #: 2711.01a

E-VC100.DAT  
Run Name: E-VC200.DAT  
E-VC300.DAT  
Page: 1

[illegible]

# E-VC100.TXT

\*\*\*\*\*

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE  
 Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT  
 2003,1985,1981 HYDROLOGY MANUAL  
 (c) Copyright 1982-2007 Advanced Engineering Software (aes)  
 Ver. 3.0 Release Date: 06/01/2007 License ID 1355

Analysis prepared by:

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 (858) 554-1500

\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*  
 \* CIELO - AREA V/C \*  
 \* EXISTING HYDROLOGY \*  
 \* \*  
 \*\*\*\*\*

FILE NAME: E-VC100.DAT  
 TIME/DATE OF STUDY: 16:11 02/23/2011

## ----- USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION: -----

### 2003 SAN DIEGO MANUAL CRITERIA

USER SPECIFIED STORM EVENT(YEAR) = 100.00  
 6-HOUR DURATION PRECIPITATION (INCHES) = 3.100  
 SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00  
 SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90  
 SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD  
 NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS

\*USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL\*

NO.	HALF- CROWN TO		STREET-CROSSFALL:		CURB	GUTTER-GEOMETRIES:				MANNING
	WIDTH	CROSSFALL	IN- /	OUT-/PARK-		HEIGHT	WIDTH	LIP	HIKE	
	(FT)	(FT)	SIDE /	SIDE/ WAY	(FT)	(FT)	(FT)	(FT)	(n)	
1	18.0	1.0	0.020/0.020/0.020		0.50	1.50	0.0313	0.125	0.0150	

### GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.50 FEET  
 as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)\*(Velocity) Constraint = 6.0 (FT\*FT/S)

\*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN  
 OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.\*

\*\*\*\*\*

FLOW PROCESS FROM NODE 25.00 TO NODE 20.00 IS CODE = 21

## ----- >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<< -----

\*USER SPECIFIED(SUBAREA):  
 USER-SPECIFIED RUNOFF COEFFICIENT = .3500  
 S.C.S. CURVE NUMBER (AMC II) = 0  
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 60.00

E-VC100.TXT

UPSTREAM ELEVATION(FEET) = 1188.00  
 DOWNSTREAM ELEVATION(FEET) = 1176.00  
 ELEVATION DIFFERENCE(FEET) = 12.00  
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 4.854  
 WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!  
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 8.168  
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.  
 SUBAREA RUNOFF(CFS) = 0.17  
 TOTAL AREA(ACRES) = 0.06 TOTAL RUNOFF(CFS) = 0.17

\*\*\*\*\*

FLOW PROCESS FROM NODE 20.00 TO NODE 15.00 IS CODE = 52

-----  
 >>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<

>>>>TRAVELTIME THRU SUBAREA<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1176.00 DOWNSTREAM(FEET) = 1166.00  
 CHANNEL LENGTH THRU SUBAREA(FEET) = 300.00 CHANNEL SLOPE = 0.0333  
 NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION  
 CHANNEL FLOW THRU SUBAREA(CFS) = 0.17  
 FLOW VELOCITY(FEET/SEC) = 2.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)  
 TRAVEL TIME(MIN.) = 1.83 Tc(MIN.) = 6.68  
 LONGEST FLOWPATH FROM NODE 25.00 TO NODE 15.00 = 360.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 20.00 TO NODE 15.00 IS CODE = 81

-----  
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.776  
 \*USER SPECIFIED(SUBAREA):  
 USER-SPECIFIED RUNOFF COEFFICIENT = .3500  
 S.C.S. CURVE NUMBER (AMC II) = 0  
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500  
 SUBAREA AREA(ACRES) = 0.33 SUBAREA RUNOFF(CFS) = 0.78  
 TOTAL AREA(ACRES) = 0.4 TOTAL RUNOFF(CFS) = 0.92  
 TC(MIN.) = 6.68

\*\*\*\*\*

FLOW PROCESS FROM NODE 15.00 TO NODE 1.00 IS CODE = 52

-----  
 >>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<

>>>>TRAVELTIME THRU SUBAREA<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1166.00 DOWNSTREAM(FEET) = 1026.00  
 CHANNEL LENGTH THRU SUBAREA(FEET) = 320.00 CHANNEL SLOPE = 0.4375  
 NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION  
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION  
 CHANNEL FLOW THRU SUBAREA(CFS) = 0.92  
 FLOW VELOCITY(FEET/SEC) = 4.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)  
 TRAVEL TIME(MIN.) = 1.12 Tc(MIN.) = 7.80  
 LONGEST FLOWPATH FROM NODE 25.00 TO NODE 1.00 = 680.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 1.00 TO NODE 1.00 IS CODE = 1

-----  
 >>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

E-VC100.TXT

TOTAL NUMBER OF STREAMS = 2  
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:  
 TIME OF CONCENTRATION(MIN.) = 7.80  
 RAINFALL INTENSITY(INCH/HR) = 6.13  
 TOTAL STREAM AREA(ACRES) = 0.39  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 0.92

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 10.00 TO NODE 5.00 IS CODE = 21  
 -----

>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

=====

\*USER SPECIFIED(SUBAREA):  
 USER-SPECIFIED RUNOFF COEFFICIENT = .3500  
 S.C.S. CURVE NUMBER (AMC II) = 0  
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 65.00  
 UPSTREAM ELEVATION(FEET) = 1188.00  
 DOWNSTREAM ELEVATION(FEET) = 1173.00  
 ELEVATION DIFFERENCE(FEET) = 15.00  
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 5.052  
 WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!  
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 8.113  
 SUBAREA RUNOFF(CFS) = 0.20  
 TOTAL AREA(ACRES) = 0.07 TOTAL RUNOFF(CFS) = 0.20

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5.00 TO NODE 1.00 IS CODE = 52  
 -----

>>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<

>>>>>TRAVELTIME THRU SUBAREA<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1173.00 DOWNSTREAM(FEET) = 1026.00  
 CHANNEL LENGTH THRU SUBAREA(FEET) = 400.00 CHANNEL SLOPE = 0.3675  
 NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION  
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION  
 CHANNEL FLOW THRU SUBAREA(CFS) = 0.20  
 FLOW VELOCITY(FEET/SEC) = 4.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)  
 TRAVEL TIME(MIN.) = 1.41 Tc(MIN.) = 6.46  
 LONGEST FLOWPATH FROM NODE 10.00 TO NODE 1.00 = 465.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 5.00 TO NODE 1.00 IS CODE = 81  
 -----

>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.925  
 \*USER SPECIFIED(SUBAREA):  
 USER-SPECIFIED RUNOFF COEFFICIENT = .3500  
 S.C.S. CURVE NUMBER (AMC II) = 0  
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500  
 SUBAREA AREA(ACRES) = 3.24 SUBAREA RUNOFF(CFS) = 7.85  
 TOTAL AREA(ACRES) = 3.3 TOTAL RUNOFF(CFS) = 8.02  
 TC(MIN.) = 6.46

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 1.00 TO NODE 1.00 IS CODE = 1  
 -----

>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

E-VC100.TXT

>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

```
=====
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 6.46
RAINFALL INTENSITY(INCH/HR) = 6.93
TOTAL STREAM AREA(ACRES) = 3.31
PEAK FLOW RATE(CFS) AT CONFLUENCE = 8.02
```

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	0.92	7.80	6.129	0.39
2	8.02	6.46	6.925	3.31

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO  
CONFLUENCE FORMULA USED FOR 2 STREAMS.

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	8.79	6.46	6.925
2	8.03	7.80	6.129

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

```
PEAK FLOW RATE(CFS) = 8.79 Tc(MIN.) = 6.46
TOTAL AREA(ACRES) = 3.7
LONGEST FLOWPATH FROM NODE 25.00 TO NODE 1.00 = 680.00 FEET.
```

END OF STUDY SUMMARY:

```
TOTAL AREA(ACRES) = 3.7 TC(MIN.) = 6.46
PEAK FLOW RATE(CFS) = 8.79
```

END OF RATIONAL METHOD ANALYSIS

□

E-VC200.TXT

\*\*\*\*\*

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Analysis prepared by:

FUSCOE ENGINEERING - SAN DIEGO, INC.  
 6390 GREENWICH DRIVE, SUITE 170  
 SAN DIEGO, CALIFORNIA 92122  
 (858) 554-1500

\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*  
 \* CIELO - AREA V/C \*  
 \* EXISTING HYDROLOGY \*  
 \* \*  
 \*\*\*\*\*

FILE NAME: E-VC200.DAT  
 TIME/DATE OF STUDY: 16:12 02/23/2011

-----  
 USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:  
 -----

2003 SAN DIEGO MANUAL CRITERIA

USER SPECIFIED STORM EVENT(YEAR) = 100.00  
 6-HOUR DURATION PRECIPITATION (INCHES) = 3.100  
 SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00  
 SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90  
 SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD  
 NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS

\*USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL\*

NO.	HALF- CROWN TO		STREET-CROSSFALL:		CURB	GUTTER-GEOMETRIES:				MANNING
	WIDTH	CROSSFALL	IN-	OUT-/PARK-		HEIGHT	WIDTH	LIP	HIKE	
	(FT)	(FT)	SIDE /	SIDE/ WAY	(FT)	(FT)	(FT)	(FT)	(n)	
1	18.0	1.0	0.020/0.020/0.020		0.50	1.50	0.0313	0.125	0.0150	

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.50 FEET  
 as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)\*(Velocity) Constraint = 6.0 (FT\*FT/S)

\*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN  
 OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.\*

\*\*\*\*\*

FLOW PROCESS FROM NODE 220.00 TO NODE 215.00 IS CODE = 21

-----  
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<  
 =====

\*USER SPECIFIED(SUBAREA):  
 USER-SPECIFIED RUNOFF COEFFICIENT = .3500  
 S.C.S. CURVE NUMBER (AMC II) = 0  
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 55.00

E-VC200.TXT

UPSTREAM ELEVATION(FEET) = 1188.00  
 DOWNSTREAM ELEVATION(FEET) = 1169.00  
 ELEVATION DIFFERENCE(FEET) = 19.00  
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 4.647  
 WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!  
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 8.168  
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.  
 SUBAREA RUNOFF(CFS) = 0.14  
 TOTAL AREA(ACRES) = 0.05 TOTAL RUNOFF(CFS) = 0.14

\*\*\*\*\*

FLOW PROCESS FROM NODE 215.00 TO NODE 2.00 IS CODE = 52

>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<

>>>>TRAVELTIME THRU SUBAREA<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1169.00 DOWNSTREAM(FEET) = 1122.00  
 CHANNEL LENGTH THRU SUBAREA(FEET) = 350.00 CHANNEL SLOPE = 0.1343  
 NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION  
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION  
 CHANNEL FLOW THRU SUBAREA(CFS) = 0.14  
 FLOW VELOCITY(FEET/SEC) = 4.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)  
 TRAVEL TIME(MIN.) = 1.23 Tc(MIN.) = 5.88  
 LONGEST FLOWPATH FROM NODE 220.00 TO NODE 2.00 = 405.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 215.00 TO NODE 2.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.359  
 \*USER SPECIFIED(SUBAREA):  
 USER-SPECIFIED RUNOFF COEFFICIENT = .3500  
 S.C.S. CURVE NUMBER (AMC II) = 0  
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500  
 SUBAREA AREA(ACRES) = 0.64 SUBAREA RUNOFF(CFS) = 1.65  
 TOTAL AREA(ACRES) = 0.7 TOTAL RUNOFF(CFS) = 1.78  
 TC(MIN.) = 5.88

\*\*\*\*\*

FLOW PROCESS FROM NODE 2.00 TO NODE 2.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

TOTAL NUMBER OF STREAMS = 2  
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:  
 TIME OF CONCENTRATION(MIN.) = 5.88  
 RAINFALL INTENSITY(INCH/HR) = 7.36  
 TOTAL STREAM AREA(ACRES) = 0.69  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.78

\*\*\*\*\*

FLOW PROCESS FROM NODE 210.00 TO NODE 205.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

\*USER SPECIFIED(SUBAREA):  
 USER-SPECIFIED RUNOFF COEFFICIENT = .3500

## E-VC200.TXT

S.C.S. CURVE NUMBER (AMC II) = 0  
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 75.00  
 UPSTREAM ELEVATION(FEET) = 1188.00  
 DOWNSTREAM ELEVATION(FEET) = 1176.00  
 ELEVATION DIFFERENCE(FEET) = 12.00  
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 5.427  
 WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!  
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.747  
 SUBAREA RUNOFF(CFS) = 0.19  
 TOTAL AREA(ACRES) = 0.07 TOTAL RUNOFF(CFS) = 0.19

\*\*\*\*\*

FLOW PROCESS FROM NODE 205.00 TO NODE 2.00 IS CODE = 52

>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<

>>>>TRAVELTIME THRU SUBAREA<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1176.00 DOWNSTREAM(FEET) = 1122.00  
 CHANNEL LENGTH THRU SUBAREA(FEET) = 300.00 CHANNEL SLOPE = 0.1800  
 NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION  
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION  
 CHANNEL FLOW THRU SUBAREA(CFS) = 0.19  
 FLOW VELOCITY(FEET/SEC) = 4.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)  
 TRAVEL TIME(MIN.) = 1.05 Tc(MIN.) = 6.48  
 LONGEST FLOWPATH FROM NODE 210.00 TO NODE 2.00 = 375.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 205.00 TO NODE 2.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.909  
 \*USER SPECIFIED(SUBAREA):  
 USER-SPECIFIED RUNOFF COEFFICIENT = .3500  
 S.C.S. CURVE NUMBER (AMC II) = 0  
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500  
 SUBAREA AREA(ACRES) = 0.34 SUBAREA RUNOFF(CFS) = 0.82  
 TOTAL AREA(ACRES) = 0.4 TOTAL RUNOFF(CFS) = 0.99  
 TC(MIN.) = 6.48

\*\*\*\*\*

FLOW PROCESS FROM NODE 2.00 TO NODE 2.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<

>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<

TOTAL NUMBER OF STREAMS = 2  
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:  
 TIME OF CONCENTRATION(MIN.) = 6.48  
 RAINFALL INTENSITY(INCH/HR) = 6.91  
 TOTAL STREAM AREA(ACRES) = 0.41  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 0.99

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	1.78	5.88	7.359	0.69
2	0.99	6.48	6.909	0.41

E-VC200.TXT

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO  
CONFLUENCE FORMULA USED FOR 2 STREAMS.

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	2.68	5.88	7.359
2	2.66	6.48	6.909

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 2.68 Tc(MIN.) = 5.88

TOTAL AREA(ACRES) = 1.1

LONGEST FLOWPATH FROM NODE 220.00 TO NODE 2.00 = 405.00 FEET.

=====

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 1.1 TC(MIN.) = 5.88

PEAK FLOW RATE(CFS) = 2.68

=====

END OF RATIONAL METHOD ANALYSIS

□

\*\*\*\*\*

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Analysis prepared by:

FUSCOE ENGINEERING - SAN DIEGO, INC.  
 6390 GREENWICH DRIVE, SUITE 170  
 SAN DIEGO, CALIFORNIA 92122  
 (858) 554-1500

\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*  
 \* EXISTING HYDROLOGY \*  
 \* CIELO - AREA V/C \*  
 \* \*  
 \*\*\*\*\*

FILE NAME: E-VC300.DAT  
 TIME/DATE OF STUDY: 16:53 03/01/2011

-----  
 USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:  
 -----

2003 SAN DIEGO MANUAL CRITERIA

USER SPECIFIED STORM EVENT(YEAR) = 100.00  
 6-HOUR DURATION PRECIPITATION (INCHES) = 3.100  
 SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00  
 SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90  
 SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD  
 NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS

\*USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL\*

NO.	HALF- WIDTH	CROWN TO CROSSFALL	STREET-CROSSFALL: IN- / OUT-/PARK- SIDE / SIDE/ WAY	CURB HEIGHT	GUTTER-GEOMETRIES: WIDTH LIP HIKE	MANNING FACTOR
	(FT)	(FT)		(FT)	(FT) (FT) (FT)	(n)
1	18.0	1.0	0.020/0.020/0.020	0.50	1.50 0.0313 0.125	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.50 FEET  
 as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)\*(Velocity) Constraint = 6.0 (FT\*FT/S)

\*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN  
 OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.\*

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 310.00 TO NODE 305.00 IS CODE = 21  
 -----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

=====

\*USER SPECIFIED(SUBAREA):  
 USER-SPECIFIED RUNOFF COEFFICIENT = .9000  
 S.C.S. CURVE NUMBER (AMC II) = 0  
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 55.00  
 UPSTREAM ELEVATION(FEET) = 1161.00  
 DOWNSTREAM ELEVATION(FEET) = 1160.00  
 ELEVATION DIFFERENCE(FEET) = 1.00  
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 2.187  
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 8.168

E-VC300.TXT

NOTE: RAINFALL INTENSITY IS BASED ON TC = 5-MINUTE.

SUBAREA RUNOFF(CFS) = 0.37

TOTAL AREA(ACRES) = 0.05 TOTAL RUNOFF(CFS) = 0.37

\*\*\*\*\*

FLOW PROCESS FROM NODE 305.00 TO NODE 300.00 IS CODE = 62

>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<

>>>>>(STREET TABLE SECTION # 1 USED)<<<<<

UPSTREAM ELEVATION(FEET) = 1160.00 DOWNSTREAM ELEVATION(FEET) = 1126.00

STREET LENGTH(FEET) = 630.00 CURB HEIGHT(INCHES) = 6.0

STREET HALFWIDTH(FEET) = 18.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 1.00

INSIDE STREET CROSSFALL(DECIMAL) = 0.020

OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1

STREET PARKWAY CROSSFALL(DECIMAL) = 0.020

Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150

Manning's FRICTION FACTOR for Back-of-walk Flow Section = 0.0200

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 2.39

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.26

HALFSTREET FLOOD WIDTH(FEET) = 6.62

AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.30

PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.11

STREET FLOW TRAVEL TIME(MIN.) = 2.44 TC(MIN.) = 4.63

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 8.168

NOTE: RAINFALL INTENSITY IS BASED ON TC = 5-MINUTE.

\*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .5000

S.C.S. CURVE NUMBER (AMC II) = 0

AREA-AVERAGE RUNOFF COEFFICIENT = 0.519

SUBAREA AREA(ACRES) = 0.99 SUBAREA RUNOFF(CFS) = 4.04

TOTAL AREA(ACRES) = 1.0 PEAK FLOW RATE(CFS) = 4.41

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.30 HALFSTREET FLOOD WIDTH(FEET) = 8.86

FLOW VELOCITY(FEET/SEC.) = 4.89 DEPTH\*VELOCITY(FT\*FT/SEC.) = 1.48

LONGEST FLOWPATH FROM NODE 310.00 TO NODE 300.00 = 685.00 FEET.

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 1.0 TC(MIN.) = 4.63

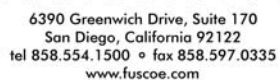
PEAK FLOW RATE(CFS) = 4.41

END OF RATIONAL METHOD ANALYSIS

□

**100-Year Storm**

**Proposed Conditions**



Job #: 2711.01a

Page: 1

[illegible]

\*\*\*\*\*

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Analysis prepared by:

FUSCOE ENGINEERING - SAN DIEGO, INC.  
 6390 GREENWICH DRIVE, SUITE 170  
 SAN DIEGO, CALIFORNIA 92122  
 (858) 554-1500

\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*  
 \* CIELO - AREA V/C \*  
 \* PROPOSED HYDROLOGY \*  
 \* \*  
 \*\*\*\*\*

FILE NAME: P-VC100.DAT  
 TIME/DATE OF STUDY: 15:32 02/28/2011

-----  
 USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:  
 -----

2003 SAN DIEGO MANUAL CRITERIA

USER SPECIFIED STORM EVENT(YEAR) = 100.00  
 6-HOUR DURATION PRECIPITATION (INCHES) = 3.100  
 SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00  
 SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90  
 SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD  
 NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS  
 \*USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL\*

NO.	HALF- WIDTH	CROWN TO CROSSFALL	STREET-CROSSFALL: IN- / OUT-/PARK- SIDE / SIDE/ WAY	CURB HEIGHT	GUTTER-GEOMETRIES: WIDTH LIP HIKE	MANNING FACTOR
	(FT)	(FT)		(FT)	(FT) (FT) (FT)	(n)
1	18.0	1.0	0.020/0.020/0.020	0.50	1.50 0.0313 0.125	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.50 FEET  
 as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)\*(Velocity) Constraint = 6.0 (FT\*FT/S)

\*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN  
 OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.\*

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 45.00 TO NODE 40.00 IS CODE = 21  
 -----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

=====

\*USER SPECIFIED(SUBAREA):  
 USER-SPECIFIED RUNOFF COEFFICIENT = .5800  
 S.C.S. CURVE NUMBER (AMC II) = 0  
 INITIAL SUBAREA FLOW-LENGTH(Feet) = 65.00  
 UPSTREAM ELEVATION(Feet) = 1170.00  
 DOWNSTREAM ELEVATION(Feet) = 1168.70  
 ELEVATION DIFFERENCE(Feet) = 1.30  
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 5.990  
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.270

P-VC100.TXT

SUBAREA RUNOFF(CFS) = 0.63  
TOTAL AREA(ACRES) = 0.15 TOTAL RUNOFF(CFS) = 0.63

\*\*\*\*\*

FLOW PROCESS FROM NODE 40.00 TO NODE 35.00 IS CODE = 62

>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<  
>>>>>(STREET TABLE SECTION # 1 USED)<<<<<

UPSTREAM ELEVATION(FEET) = 1168.70 DOWNSTREAM ELEVATION(FEET) = 1158.00  
STREET LENGTH(FEET) = 370.00 CURB HEIGHT(INCHES) = 6.0  
STREET HALFWIDTH(FEET) = 18.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 1.00  
INSIDE STREET CROSSFALL(DECIMAL) = 0.020  
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1  
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020  
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150  
Manning's FRICTION FACTOR for Back-of-Walk Flow Section = 0.0200

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 2.38  
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:  
STREET FLOW DEPTH(FEET) = 0.28  
HALFSTREET FLOOD WIDTH(FEET) = 7.71  
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.34  
PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 0.94  
STREET FLOW TRAVEL TIME(MIN.) = 1.85 Tc(MIN.) = 7.83  
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.113  
\*USER SPECIFIED(SUBAREA):  
USER-SPECIFIED RUNOFF COEFFICIENT = .5800  
S.C.S. CURVE NUMBER (AMC II) = 0  
AREA-AVERAGE RUNOFF COEFFICIENT = 0.580  
SUBAREA AREA(ACRES) = 0.98 SUBAREA RUNOFF(CFS) = 3.47  
TOTAL AREA(ACRES) = 1.1 PEAK FLOW RATE(CFS) = 4.01

END OF SUBAREA STREET FLOW HYDRAULICS:  
DEPTH(FEET) = 0.32 HALFSTREET FLOOD WIDTH(FEET) = 9.70  
FLOW VELOCITY(FEET/SEC.) = 3.78 DEPTH\*VELOCITY(FT\*FT/SEC.) = 1.21  
LONGEST FLOWPATH FROM NODE 45.00 TO NODE 35.00 = 435.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 35.00 TO NODE 35.00 IS CODE = 1

>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

TOTAL NUMBER OF STREAMS = 2  
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:  
TIME OF CONCENTRATION(MIN.) = 7.83  
RAINFALL INTENSITY(INCH/HR) = 6.11  
TOTAL STREAM AREA(ACRES) = 1.13  
PEAK FLOW RATE(CFS) AT CONFLUENCE = 4.01

\*\*\*\*\*

FLOW PROCESS FROM NODE 30.00 TO NODE 25.00 IS CODE = 21

>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

\*USER SPECIFIED(SUBAREA):  
USER-SPECIFIED RUNOFF COEFFICIENT = .5800  
S.C.S. CURVE NUMBER (AMC II) = 0  
INITIAL SUBAREA FLOW-LENGTH(FEET) = 65.00

```

                                P-VC100.TXT
UPSTREAM ELEVATION(FEET) = 1169.60
DOWNSTREAM ELEVATION(FEET) = 1168.30
ELEVATION DIFFERENCE(FEET) = 1.30
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 5.990
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.270
SUBAREA RUNOFF(CFS) = 0.67
TOTAL AREA(ACRES) = 0.16 TOTAL RUNOFF(CFS) = 0.67
*****
FLOW PROCESS FROM NODE 25.00 TO NODE 20.00 IS CODE = 62
-----
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION # 1 USED)<<<<<
=====
UPSTREAM ELEVATION(FEET) = 1168.30 DOWNSTREAM ELEVATION(FEET) = 1158.00
STREET LENGTH(FEET) = 270.00 CURB HEIGHT(INCHES) = 6.0
STREET HALFWIDTH(FEET) = 18.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 1.00
INSIDE STREET CROSSFALL(DECIMAL) = 0.020
OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1
STREET PARKWAY CROSSFALL(DECIMAL) = 0.020
Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150
Manning's FRICTION FACTOR for Back-of-walk Flow Section = 0.0200

**TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 2.02
STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
STREET FLOW DEPTH(FEET) = 0.26
HALFSTREET FLOOD WIDTH(FEET) = 6.62
AVERAGE FLOW VELOCITY(FEET/SEC.) = 3.64
PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) = 0.94
STREET FLOW TRAVEL TIME(MIN.) = 1.24 Tc(MIN.) = 7.23
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.440
*USER SPECIFIED(SUBAREA):
USER-SPECIFIED RUNOFF COEFFICIENT = .5800
S.C.S. CURVE NUMBER (AMC II) = 0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.580
SUBAREA AREA(ACRES) = 0.72 SUBAREA RUNOFF(CFS) = 2.69
TOTAL AREA(ACRES) = 0.9 PEAK FLOW RATE(CFS) = 3.29

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.29 HALFSTREET FLOOD WIDTH(FEET) = 8.37
FLOW VELOCITY(FEET/SEC.) = 4.01 DEPTH*VELOCITY(FT*FT/SEC.) = 1.18
LONGEST FLOWPATH FROM NODE 30.00 TO NODE 20.00 = 335.00 FEET.
*****
FLOW PROCESS FROM NODE 20.00 TO NODE 35.00 IS CODE = 31
-----
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1152.00 DOWNSTREAM(FEET) = 1151.50
FLOW LENGTH(FEET) = 35.00 MANNING'S N = 0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN 18.0 INCH PIPE IS 6.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.76
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 3.29
PIPE TRAVEL TIME(MIN.) = 0.10 Tc(MIN.) = 7.33
LONGEST FLOWPATH FROM NODE 30.00 TO NODE 35.00 = 370.00 FEET.

```

P-VC100.TXT

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 35.00 TO NODE 35.00 IS CODE = 1  
 -----

>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<  
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

=====

TOTAL NUMBER OF STREAMS =	2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:	
TIME OF CONCENTRATION(MIN.) =	7.33
RAINFALL INTENSITY(INCH/HR) =	6.38
TOTAL STREAM AREA(ACRES) =	0.88
PEAK FLOW RATE(CFS) AT CONFLUENCE =	3.29

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	4.01	7.83	6.113	1.13
2	3.29	7.33	6.382	0.88

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO  
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

\*\* PEAK FLOW RATE TABLE \*\*

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	7.03	7.33	6.382
2	7.16	7.83	6.113

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) =	7.16	Tc(MIN.) =	7.83
TOTAL AREA(ACRES) =	2.0		
LONGEST FLOWPATH FROM NODE	45.00 TO NODE	35.00 =	435.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 35.00 TO NODE 15.00 IS CODE = 31  
 -----

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<  
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) =	1151.50	DOWNSTREAM(FEET) =	1150.00
FLOW LENGTH(FEET) =	30.00	MANNING'S N =	0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO	18.000		
DEPTH OF FLOW IN 18.0 INCH PIPE IS	7.0 INCHES		
PIPE-FLOW VELOCITY(FEET/SEC.) =	11.23		
ESTIMATED PIPE DIAMETER(INCH) =	18.00	NUMBER OF PIPES =	1
PIPE-FLOW(CFS) =	7.16		
PIPE TRAVEL TIME(MIN.) =	0.04	Tc(MIN.) =	7.88
LONGEST FLOWPATH FROM NODE	45.00 TO NODE	15.00 =	465.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 15.00 TO NODE 10.00 IS CODE = 52  
 -----

>>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<  
 >>>>>TRAVELTIME THRU SUBAREA<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) =	1150.00	DOWNSTREAM(FEET) =	1149.50
CHANNEL LENGTH THRU SUBAREA(FEET) =	50.00	CHANNEL SLOPE =	0.0100
CHANNEL FLOW THRU SUBAREA(CFS) =	7.16		
FLOW VELOCITY(FEET/SEC) =	2.30 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)		
TRAVEL TIME(MIN.) =	0.36	Tc(MIN.) =	8.24
LONGEST FLOWPATH FROM NODE	45.00 TO NODE	10.00 =	515.00 FEET.

\*\*\*\*\*  
 Page 4

```

                                P-VC100.TXT
FLOW PROCESS FROM NODE      15.00 TO NODE      10.00 IS CODE =  81
-----
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.917
*USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =  0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5510
  SUBAREA AREA(ACRES) =  0.29  SUBAREA RUNOFF(CFS) =  0.60
  TOTAL AREA(ACRES) =  2.3  TOTAL RUNOFF(CFS) =  7.50
  TC(MIN.) =  8.24
*****
FLOW PROCESS FROM NODE      10.00 TO NODE      5.00 IS CODE =  31
-----
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
=====
  ELEVATION DATA: UPSTREAM(FEET) = 1145.50  DOWNSTREAM(FEET) = 1144.50
  FLOW LENGTH(FEET) = 100.00  MANNING'S N = 0.013
  DEPTH OF FLOW IN 18.0 INCH PIPE IS 11.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  6.19
  ESTIMATED PIPE DIAMETER(INCH) = 18.00  NUMBER OF PIPES =  1
  PIPE-FLOW(CFS) =  7.50
  PIPE TRAVEL TIME(MIN.) =  0.27  Tc(MIN.) =  8.51
  LONGEST FLOWPATH FROM NODE  45.00 TO NODE  5.00 =  615.00 FEET.
*****
FLOW PROCESS FROM NODE      5.00 TO NODE      1.00 IS CODE =  52
-----
>>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
=====
  ELEVATION DATA: UPSTREAM(FEET) = 1144.50  DOWNSTREAM(FEET) = 1026.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  200.00  CHANNEL SLOPE = 0.5925
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =  7.50
  FLOW VELOCITY(FEET/SEC) =  7.36 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =  0.45  Tc(MIN.) =  8.96
  LONGEST FLOWPATH FROM NODE  45.00 TO NODE  1.00 =  815.00 FEET.
*****
FLOW PROCESS FROM NODE      5.00 TO NODE      1.00 IS CODE =  81
-----
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.605
*USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =  0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4534
  SUBAREA AREA(ACRES) =  2.17  SUBAREA RUNOFF(CFS) =  4.26
  TOTAL AREA(ACRES) =  4.5  TOTAL RUNOFF(CFS) =  11.36
  TC(MIN.) =  8.96
=====
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES) =  4.5  TC(MIN.) =  8.96
  PEAK FLOW RATE(CFS) =  11.36
=====
  END OF RATIONAL METHOD ANALYSIS

```

\*\*\*\*\*

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE  
 Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT  
 2003,1985,1981 HYDROLOGY MANUAL  
 (c) Copyright 1982-2007 Advanced Engineering Software (aes)  
 Ver. 3.0 Release Date: 06/01/2007 License ID 1355

Analysis prepared by:

FUSCOE ENGINEERING - SAN DIEGO, INC.  
 6390 GREENWICH DRIVE, SUITE 170  
 SAN DIEGO, CALIFORNIA 92122  
 (858) 554-1500

\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*  
 \* CIELO - AREA V/C \*  
 \* PROPOSED HYDROLOGY \*  
 \* \*  
 \*\*\*\*\*

FILE NAME: P-VC200.DAT  
 TIME/DATE OF STUDY: 15:21 02/28/2011

-----  
 USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:  
 -----

2003 SAN DIEGO MANUAL CRITERIA

USER SPECIFIED STORM EVENT(YEAR) = 100.00  
 6-HOUR DURATION PRECIPITATION (INCHES) = 3.100  
 SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00  
 SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90  
 SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD  
 NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS  
 \*USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL\*

NO.	HALF- WIDTH	CROWN TO CROSSFALL	STREET-CROSSFALL: IN- / OUT-/PARK- SIDE / SIDE/ WAY	CURB HEIGHT	GUTTER-GEOMETRIES: WIDTH LIP HIKE	MANNING FACTOR
	(FT)	(FT)		(FT)	(FT) (FT) (FT)	(n)
1	18.0	1.0	0.020/0.020/0.020	0.50	1.50 0.0313 0.125	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.50 FEET  
 as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)\*(Velocity) Constraint = 6.0 (FT\*FT/S)

\*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN  
 OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.\*

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 210.00 TO NODE 205.00 IS CODE = 21  
 -----

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

=====

\*USER SPECIFIED(SUBAREA):  
 USER-SPECIFIED RUNOFF COEFFICIENT = .3500  
 S.C.S. CURVE NUMBER (AMC II) = 0  
 INITIAL SUBAREA FLOW-LENGTH(Feet) = 70.00  
 UPSTREAM ELEVATION(Feet) = 1169.30  
 DOWNSTREAM ELEVATION(Feet) = 1138.00  
 ELEVATION DIFFERENCE(Feet) = 31.30  
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 5.243  
 WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!

```

                                P-VC200.TXT
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.921
SUBAREA RUNOFF(CFS) = 0.14
TOTAL AREA(ACRES) = 0.05 TOTAL RUNOFF(CFS) = 0.14
*****
FLOW PROCESS FROM NODE 205.00 TO NODE 2.00 IS CODE = 52
-----
>>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
=====
ELEVATION DATA: UPSTREAM(FEET) = 1138.00 DOWNSTREAM(FEET) = 1122.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 135.00 CHANNEL SLOPE = 0.1185
NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
CHANNEL FLOW THRU SUBAREA(CFS) = 0.14
FLOW VELOCITY(FEET/SEC) = 4.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) = 0.47 Tc(MIN.) = 5.72
LONGEST FLOWPATH FROM NODE 210.00 TO NODE 2.00 = 205.00 FEET.
*****
FLOW PROCESS FROM NODE 205.00 TO NODE 2.00 IS CODE = 81
-----
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 7.491
*USER SPECIFIED(SUBAREA):
USER-SPECIFIED RUNOFF COEFFICIENT = .3500
S.C.S. CURVE NUMBER (AMC II) = 0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
SUBAREA AREA(ACRES) = 0.39 SUBAREA RUNOFF(CFS) = 1.02
TOTAL AREA(ACRES) = 0.4 TOTAL RUNOFF(CFS) = 1.15
TC(MIN.) = 5.72
=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 0.4 TC(MIN.) = 5.72
PEAK FLOW RATE(CFS) = 1.15
=====
END OF RATIONAL METHOD ANALYSIS

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RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE  
 Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT  
 2003,1985,1981 HYDROLOGY MANUAL  
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Analysis prepared by:

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 6390 GREENWICH DRIVE, SUITE 170  
 SAN DIEGO, CALIFORNIA 92122  
 (858) 554-1500

\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*  
 \* CIELO - AREA V/C \*  
 \* PROPOSED HYDROLOGY \*  
 \* \*  
 \*\*\*\*\*

FILE NAME: P-VC300.DAT  
 TIME/DATE OF STUDY: 16:50 03/01/2011

-----  
 USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:  
 -----

2003 SAN DIEGO MANUAL CRITERIA

USER SPECIFIED STORM EVENT(YEAR) = 100.00  
 6-HOUR DURATION PRECIPITATION (INCHES) = 3.100  
 SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00  
 SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90  
 SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD  
 NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS  
 \*USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL\*

NO.	HALF- WIDTH	CROWN TO CROSSFALL	STREET-CROSSFALL: IN- / OUT-/PARK- SIDE / SIDE/ WAY	CURB HEIGHT	GUTTER-GEOMETRIES: WIDTH LIP	MANNING HIKE FACTOR
	(FT)	(FT)		(FT)	(FT) (FT)	(n)
1	18.0	1.0	0.020/0.020/0.020	0.50	1.50 0.0313	0.125 0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.50 FEET  
 as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)\*(Velocity) Constraint = 6.0 (FT\*FT/S)

\*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN  
 OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.\*

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 310.00 TO NODE 305.00 IS CODE = 21  
 -----

>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

=====

\*USER SPECIFIED(SUBAREA):  
 USER-SPECIFIED RUNOFF COEFFICIENT = .9000  
 S.C.S. CURVE NUMBER (AMC II) = 0  
 INITIAL SUBAREA FLOW-LENGTH(Feet) = 55.00  
 UPSTREAM ELEVATION(Feet) = 1161.00  
 DOWNSTREAM ELEVATION(Feet) = 1160.00  
 ELEVATION DIFFERENCE(Feet) = 1.00  
 SUBAREA OVERLAND TIME OF FLOW(MIN.) = 2.187  
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 8.168

P-VC300.TXT

NOTE: RAINFALL INTENSITY IS BASED ON TC = 5-MINUTE.

SUBAREA RUNOFF(CFS) = 0.22

TOTAL AREA(ACRES) = 0.03 TOTAL RUNOFF(CFS) = 0.22

\*\*\*\*\*

FLOW PROCESS FROM NODE 305.00 TO NODE 3.00 IS CODE = 62

>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<

>>>>>(STREET TABLE SECTION # 1 USED)<<<<<

UPSTREAM ELEVATION(FEET) = 1160.00 DOWNSTREAM ELEVATION(FEET) = 1126.00

STREET LENGTH(FEET) = 630.00 CURB HEIGHT(INCHES) = 6.0

STREET HALFWIDTH(FEET) = 18.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) = 1.00

INSIDE STREET CROSSFALL(DECIMAL) = 0.020

OUTSIDE STREET CROSSFALL(DECIMAL) = 0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF = 1

STREET PARKWAY CROSSFALL(DECIMAL) = 0.020

Manning's FRICTION FACTOR for Streetflow Section(curbs-to-curbs) = 0.0150

Manning's FRICTION FACTOR for Back-of-walk Flow Section = 0.0200

\*\*TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 2.15

STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:

STREET FLOW DEPTH(FEET) = 0.25

HALFSTREET FLOOD WIDTH(FEET) = 6.25

AVERAGE FLOW VELOCITY(FEET/SEC.) = 4.22

PRODUCT OF DEPTH&VELOCITY(FT\*FT/SEC.) = 1.06

STREET FLOW TRAVEL TIME(MIN.) = 2.49 TC(MIN.) = 4.68

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 8.168

NOTE: RAINFALL INTENSITY IS BASED ON TC = 5-MINUTE.

\*USER SPECIFIED(SUBAREA):

USER-SPECIFIED RUNOFF COEFFICIENT = .5300

S.C.S. CURVE NUMBER (AMC II) = 0

AREA-AVERAGE RUNOFF COEFFICIENT = 0.542

SUBAREA AREA(ACRES) = 0.89 SUBAREA RUNOFF(CFS) = 3.85

TOTAL AREA(ACRES) = 0.9 PEAK FLOW RATE(CFS) = 4.07

END OF SUBAREA STREET FLOW HYDRAULICS:

DEPTH(FEET) = 0.30 HALFSTREET FLOOD WIDTH(FEET) = 8.55

FLOW VELOCITY(FEET/SEC.) = 4.79 DEPTH\*VELOCITY(FT\*FT/SEC.) = 1.43

LONGEST FLOWPATH FROM NODE 310.00 TO NODE 3.00 = 685.00 FEET.

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 0.9 TC(MIN.) = 4.68

PEAK FLOW RATE(CFS) = 4.07

END OF RATIONAL METHOD ANALYSIS

□

# **APPENDIX 3**

## **Detention Basin Calculations**

**Orifice Calculations for Basin 1**

Discharge at Depth =		6 ft					
Outlet Row	Co	Ao	H	Qo	# of Outlets	Q Row	
O1		0.6	0.349	0.67	1.37	1	1.37
O2		0.6	0.005	5.96	0.06	1	0.06
					Q total		1.44

Discharge at Depth =		5.5 ft					
Outlet Row	Co	Ao	H	Qo	# of Outlets	Q Row	
O1		0.6	0.349	0.17	0.69	1	0.69
O2		0.6	0.005	5.46	0.06	1	0.06
					Q total		0.75

Discharge at Depth =		5 ft					
Outlet Row	Co	Ao	H	Qo	# of Outlets	Q Row	
O1		0.6	0.349	0.00	0.00	1	0.00
O2		0.6	0.005	4.96	0.06	1	0.06
					Q total		0.06

Discharge at Depth =		4.5 ft					
Outlet Row	Co	Ao	H	Qo	# of Outlets	Q Row	
O1		0.6	0.349	0.00	0.00	1	0.00
O2		0.6	0.005	4.46	0.06	1	0.06
					Q total		0.06

Discharge at Depth =		4 ft					
Outlet Row	Co	Ao	H	Qo	# of Outlets	Q Row	
O1		0.6	0.349	0.00	0.00	1	0.00
O2		0.6	0.005	3.96	0.05	1	0.05
					Q total		0.05

Discharge at Depth =		3.5 ft					
Outlet Row	Co	Ao	H	Qo	# of Outlets	Q Row	
O1		0.6	0.349	0.00	0.00	1	0.00
O2		0.6	0.005	3.46	0.05	1	0.05
					Q total		0.05

Discharge at Depth =		3 ft					
Outlet Row	Co	Ao	H	Qo	# of Outlets	Q Row	
O1		0.6	0.349	0.00	0.00	1	0.00
O2		0.6	0.005	2.96	0.05	1	0.05
					Q total		0.05

Discharge at Depth =		2.5 ft					
Outlet Row	Co	Ao	H	Qo	# of Outlets	Q Row	
O1		0.6	0.349	0.00	0.00	1	0.00
O2		0.6	0.005	2.46	0.04	1	0.04
					Q total		0.04

Discharge at Depth =		2 ft					
Outlet Row	Co	Ao	H	Qo	# of Outlets	Q Row	
O1		0.6	0.349	0.00	0.00	1	0.00
O2		0.6	0.005	1.96	0.04	1	0.04
					Q total		0.04

Discharge at Depth =		1.5 ft					
Outlet Row	Co	Ao	H	Qo	# of Outlets	Q Row	
O1		0.6	0.349	0.00	0.00	1	0.00
O2		0.6	0.005	1.46	0.03	1	0.03
					Q total		0.03

Discharge at Depth =

Outlet Row

	Co	1 ft Ao	H	Qo	# of Outlets	Q Row	
O1		0.6	0.349	0.00	0.00	1	0.00
O2		0.6	0.005	0.96	0.03	1	0.03
					Q total		0.03

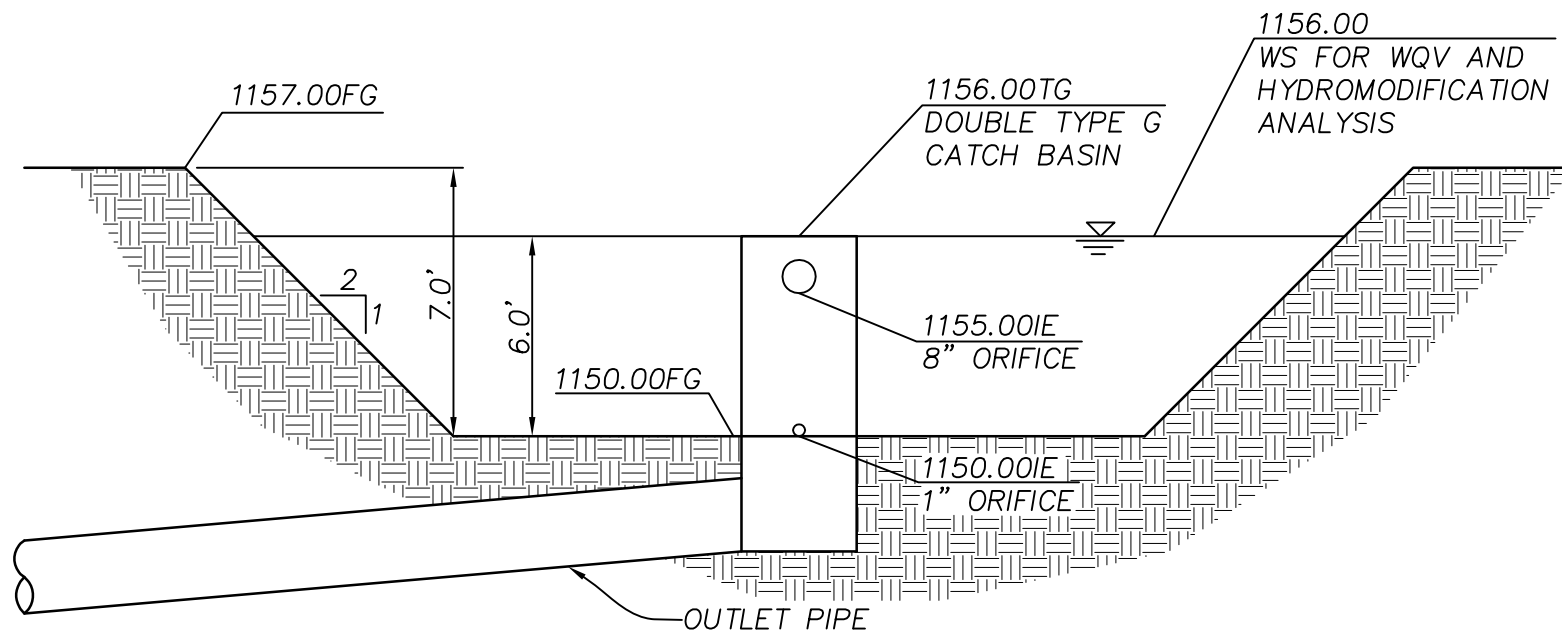
Discharge at Depth =

Outlet Row

	Co	0.5 ft Ao	H	Qo	# of Outlets	Q Row	
O1		0.6	0.349	0.00	0.00	1	0.00
O2		0.6	0.005	0.46	0.02	1	0.02
					Q total		0.02

**Stage, Discharge & Storage Table for Basin 1**

Stage	Surface Area (sf)	Storage (cf)	Storage (Af)	Q Total
0	3167	0	0.000	0.00
0.5	3443	1,653	0.038	0.02
1	3792	3,480	0.080	0.03
1.5	4080	5,435	0.125	0.03
2	4520	7,687	0.176	0.04
2.5	4840	10,009	0.230	0.04
3	5150	12,476	0.286	0.05
3.5	5480	15,132	0.347	0.05
4	5880	18,094	0.415	0.05
4.5	6240	21,166	0.486	0.06
5	6560	24,318	0.558	0.06
5.5	6930	27,767	0.637	0.75
6	7340	31,521	0.724	1.44



6390 Greenwich Drive, Suite 170  
San Diego, California 92122  
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IMP 1.1  
**OUTLET STRUCTURE DETAIL**  
NOT TO SCALE

RUN DATE 3/1/2011  
HYDROGRAPH FILE NAME Text1  
TIME OF CONCENTRATION 8 MIN.  
6 HOUR RAINFALL 3.1 INCHES  
BASIN AREA 2.31 ACRES  
RUNOFF COEFFICIENT 0.58  
PEAK DISCHARGE 7.5 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 8	DISCHARGE (CFS) = 0.2
TIME (MIN) = 16	DISCHARGE (CFS) = 0.3
TIME (MIN) = 24	DISCHARGE (CFS) = 0.3
TIME (MIN) = 32	DISCHARGE (CFS) = 0.3
TIME (MIN) = 40	DISCHARGE (CFS) = 0.3
TIME (MIN) = 48	DISCHARGE (CFS) = 0.3
TIME (MIN) = 56	DISCHARGE (CFS) = 0.3
TIME (MIN) = 64	DISCHARGE (CFS) = 0.3
TIME (MIN) = 72	DISCHARGE (CFS) = 0.3
TIME (MIN) = 80	DISCHARGE (CFS) = 0.3
TIME (MIN) = 88	DISCHARGE (CFS) = 0.3
TIME (MIN) = 96	DISCHARGE (CFS) = 0.3
TIME (MIN) = 104	DISCHARGE (CFS) = 0.3
TIME (MIN) = 112	DISCHARGE (CFS) = 0.4
TIME (MIN) = 120	DISCHARGE (CFS) = 0.4
TIME (MIN) = 128	DISCHARGE (CFS) = 0.4
TIME (MIN) = 136	DISCHARGE (CFS) = 0.4
TIME (MIN) = 144	DISCHARGE (CFS) = 0.4
TIME (MIN) = 152	DISCHARGE (CFS) = 0.5
TIME (MIN) = 160	DISCHARGE (CFS) = 0.5
TIME (MIN) = 168	DISCHARGE (CFS) = 0.5
TIME (MIN) = 176	DISCHARGE (CFS) = 0.5
TIME (MIN) = 184	DISCHARGE (CFS) = 0.6
TIME (MIN) = 192	DISCHARGE (CFS) = 0.6
TIME (MIN) = 200	DISCHARGE (CFS) = 0.7
TIME (MIN) = 208	DISCHARGE (CFS) = 0.8
TIME (MIN) = 216	DISCHARGE (CFS) = 1
TIME (MIN) = 224	DISCHARGE (CFS) = 1.1
TIME (MIN) = 232	DISCHARGE (CFS) = 1.6
TIME (MIN) = 240	DISCHARGE (CFS) = 2.8
TIME (MIN) = 248	DISCHARGE (CFS) = 7.5
TIME (MIN) = 256	DISCHARGE (CFS) = 1.3
TIME (MIN) = 264	DISCHARGE (CFS) = 0.9
TIME (MIN) = 272	DISCHARGE (CFS) = 0.7
TIME (MIN) = 280	DISCHARGE (CFS) = 0.6
TIME (MIN) = 288	DISCHARGE (CFS) = 0.5
TIME (MIN) = 296	DISCHARGE (CFS) = 0.4
TIME (MIN) = 304	DISCHARGE (CFS) = 0.4
TIME (MIN) = 312	DISCHARGE (CFS) = 0.4
TIME (MIN) = 320	DISCHARGE (CFS) = 0.3
TIME (MIN) = 328	DISCHARGE (CFS) = 0.3
TIME (MIN) = 336	DISCHARGE (CFS) = 0.3
TIME (MIN) = 344	DISCHARGE (CFS) = 0.3
TIME (MIN) = 352	DISCHARGE (CFS) = 0.3
TIME (MIN) = 360	DISCHARGE (CFS) = 0.3
TIME (MIN) = 368	DISCHARGE (CFS) = 0

## VC-WORKS.TXT

## HYDRAULICS ELEMENTS - II PROGRAM PACKAGE

## STORAGE BASIN HYDROGRAPH ROUTING MODEL

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Ver. 14.0 Release Date: 06/01/2007 License ID 1355

Analysis prepared by:

FUSCOE ENGINEERING - SAN DIEGO, INC.  
6390 GREENWICH DRIVE, SUITE 170  
SAN DIEGO, CALIFORNIA 92122  
(858) 554-1500

## \*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*

\* AREA VC  
\* CHECK TO SEE IF BASIN IS LARGE ENOUGH FOR 100 YEAR STORM  
\* PER HYDROMOD CALCULATOR: 1" OUTLET AT 0, 8" OUTLET AT 5, WEIR AT 6'  
\*\*\*\*\*

FILE NAME: VC.DAT

TIME/DATE OF STUDY: 10:51 03/01/2011

## ===== ENTERED INFORMATION: =====

TOTAL NUMBER OF INFLOW HYDROGRAPH INTERVALS = 47  
CONSTANT HYDROGRAPH TIME UNIT(MINUTES) = 8.000  
ASSUMED INITIAL DEPTH(FEET) IN STORAGE BASIN = 0.00

## ===== ENTERED INFLOW HYDROGRAPH ORDINATES(CFS): =====

*INTERVAL * NUMBER	FLOW (CFS)	*INTERVAL * NUMBER	FLOW (CFS)	*INTERVAL * NUMBER	FLOW (CFS)
* 1:	0.00*	* 2:	0.20*	* 3:	0.30*
* 4:	0.30*	* 5:	0.30*	* 6:	0.30*
* 7:	0.30*	* 8:	0.30*	* 9:	0.30*
* 10:	0.30*	* 11:	0.30*	* 12:	0.30*
* 13:	0.30*	* 14:	0.30*	* 15:	0.40*
* 16:	0.40*	* 17:	0.40*	* 18:	0.40*
* 19:	0.40*	* 20:	0.50*	* 21:	0.50*
* 22:	0.50*	* 23:	0.50*	* 24:	0.60*
* 25:	0.60*	* 26:	0.70*	* 27:	0.80*
* 28:	1.00*	* 29:	1.10*	* 30:	1.60*
* 31:	2.80*	* 32:	7.50*	* 33:	1.30*
* 34:	0.90*	* 35:	0.70*	* 36:	0.60*
* 37:	0.50*	* 38:	0.40*	* 39:	0.40*
* 40:	0.40*	* 41:	0.30*	* 42:	0.30*
* 43:	0.30*	* 44:	0.30*	* 45:	0.30*
* 46:	0.30*	* 47:	0.00*		

## ===== DEPTH-VS.-STORAGE AND DEPTH-VS.-DISCHARGE INFORMATION: =====

TOTAL NUMBER OF BASIN DEPTH INFORMATION ENTRIES = 13

*BASIN-DEPTH * (FEET)	STORAGE (ACRE-FEET)	OUTFLOW (CFS)	**BASIN-DEPTH ** (FEET)	STORAGE (ACRE-FEET)	OUTFLOW (CFS)
* 0.000	0.000	0.000	** 0.500	0.038	0.020*

VC-WORKS.TXT

*	1.000	0.080	0.030**	1.500	0.125	0.031*
*	2.000	0.176	0.040**	2.500	0.230	0.041*
*	3.000	0.286	0.050**	3.500	0.347	0.051*
*	4.000	0.415	0.052**	4.500	0.486	0.060*
*	5.000	0.558	0.061**	5.500	0.637	0.750*
*	6.000	0.724	1.440**			

\*\*\*\*\*

---

INITIAL BASIN DEPTH(FEET) = 0.00  
 INITIAL BASIN STORAGE(ACRE-FEET) = 0.00  
 INITIAL BASIN OUTFLOW(CFS) = 0.00

---

BASIN STORAGE, OUTFLOW AND DEPTH ROUTING VALUES:

INTERVAL NUMBER	{S-O*DT/2} (ACRE-FEET)	{S+O*DT/2} (ACRE-FEET)
1	0.00000	0.00000
2	0.03789	0.03811
3	0.07983	0.08017
4	0.12483	0.12517
5	0.17578	0.17622
6	0.22977	0.23023
7	0.28572	0.28628
8	0.34672	0.34728
9	0.41471	0.41529
10	0.48567	0.48633
11	0.55766	0.55834
12	0.63287	0.64113
13	0.71607	0.73193

WHERE S=STORAGE(AF);O=OUTFLOW(AF/MIN.);DT=UNIT(MIN.)

---

\*UNIT-HYDROGRAPH STORAGE-BASIN ROUTING\*

NOTE: COMPUTED BASIN DEPTH, OUTFLOW, AND STORAGE QUANTITIES  
 OCCUR AT THE GIVEN TIME. BASIN INFLOW VALUES REPRESENT THE  
 AVERAGE INFLOW DURING THE RECENT HYDROGRAPH UNIT INTERVAL.

GRAPH NOTATION: "I"=MEAN UNIT INFLOW; "O"=OUTFLOW AT GIVEN TIME

---

TIME (HOURS)	INFLOW (CFS)	OUTFLOW (CFS)	STORAGE (ACRE-FT)	0.	2.	4.	6.	8.
0.13	0.00	0.00	0.000	O	.	.	.	.
	[BASIN DEPTH(FEET) = 0.00]							
0.27	0.20	0.00	0.002	O	.	.	.	.
	[BASIN DEPTH(FEET) = 0.03]							
0.40	0.30	0.00	0.005	OI	.	.	.	.
	[BASIN DEPTH(FEET) = 0.07]							
0.53	0.30	0.00	0.009	OI	.	.	.	.
	[BASIN DEPTH(FEET) = 0.12]							
0.67	0.30	0.01	0.012	OI	.	.	.	.
	[BASIN DEPTH(FEET) = 0.16]							
0.80	0.30	0.01	0.015	OI	.	.	.	.
	[BASIN DEPTH(FEET) = 0.20]							
0.93	0.30	0.01	0.018	OI	.	.	.	.

			VC-WORKS.TXT				
	[BASIN DEPTH(FEET) =	0.24]					
1.07	0.30 0.01	0.022 OI	.	.	.	.	.
	[BASIN DEPTH(FEET) =	0.28]					
1.20	0.30 0.01	0.025 OI	.	.	.	.	.
	[BASIN DEPTH(FEET) =	0.33]					
1.33	0.30 0.01	0.028 OI	.	.	.	.	.
	[BASIN DEPTH(FEET) =	0.37]					
1.47	0.30 0.02	0.031 OI	.	.	.	.	.
	[BASIN DEPTH(FEET) =	0.41]					
1.60	0.30 0.02	0.034 OI	.	.	.	.	.
	[BASIN DEPTH(FEET) =	0.45]					
1.73	0.30 0.02	0.037 OI	.	.	.	.	.
	[BASIN DEPTH(FEET) =	0.49]					
1.87	0.30 0.02	0.040 OI	.	.	.	.	.
	[BASIN DEPTH(FEET) =	0.53]					
2.00	0.40 0.02	0.045 OI	.	.	.	.	.
	[BASIN DEPTH(FEET) =	0.58]					
2.13	0.40 0.02	0.049 OI	.	.	.	.	.
	[BASIN DEPTH(FEET) =	0.63]					
2.27	0.40 0.02	0.053 OI	.	.	.	.	.
	[BASIN DEPTH(FEET) =	0.68]					
2.40	0.40 0.02	0.057 OI	.	.	.	.	.
	[BASIN DEPTH(FEET) =	0.73]					
2.53	0.40 0.03	0.061 OI	.	.	.	.	.
	[BASIN DEPTH(FEET) =	0.78]					
2.67	0.50 0.03	0.066 O I	.	.	.	.	.
	[BASIN DEPTH(FEET) =	0.84]					
2.80	0.50 0.03	0.072 O I	.	.	.	.	.
	[BASIN DEPTH(FEET) =	0.90]					
2.93	0.50 0.03	0.077 O I	.	.	.	.	.
	[BASIN DEPTH(FEET) =	0.96]					
3.07	0.50 0.03	0.082 O I	.	.	.	.	.
	[BASIN DEPTH(FEET) =	1.02]					
3.20	0.60 0.03	0.088 O I	.	.	.	.	.
	[BASIN DEPTH(FEET) =	1.09]					
3.33	0.60 0.03	0.095 O I	.	.	.	.	.
	[BASIN DEPTH(FEET) =	1.16]					
3.47	0.70 0.03	0.102 O I	.	.	.	.	.
	[BASIN DEPTH(FEET) =	1.24]					
3.60	0.80 0.03	0.110 O I	.	.	.	.	.
	[BASIN DEPTH(FEET) =	1.34]					
3.73	1.00 0.03	0.121 O I	.	.	.	.	.
	[BASIN DEPTH(FEET) =	1.46]					
3.87	1.10 0.03	0.133 O I	.	.	.	.	.
	[BASIN DEPTH(FEET) =	1.58]					
4.00	1.60 0.04	0.150 O I	.	.	.	.	.
	[BASIN DEPTH(FEET) =	1.75]					
4.13	2.80 0.04	0.181 O	.	I	.	.	.
	[BASIN DEPTH(FEET) =	2.04]					
4.27	7.50 0.05	0.263 O	.	.	.	.	I
	[BASIN DEPTH(FEET) =	2.79]					
4.40	1.30 0.05	0.276 O I	.	.	.	.	.
	[BASIN DEPTH(FEET) =	2.92]					
4.53	0.90 0.05	0.286 O I	.	.	.	.	.
	[BASIN DEPTH(FEET) =	3.00]					
4.67	0.70 0.05	0.293 O I	.	.	.	.	.
	[BASIN DEPTH(FEET) =	3.06]					
4.80	0.60 0.05	0.299 O I	.	.	.	.	.

			VC-WORKS.TXT				
	[BASIN DEPTH(FEET) =	3.11]					
4.93	0.50 0.05	0.304 O I	.	.	.	.	.
	[BASIN DEPTH(FEET) =	3.15]					
5.07	0.40 0.05	0.308 OI	.	.	.	.	.
	[BASIN DEPTH(FEET) =	3.18]					
5.20	0.40 0.05	0.312 OI	.	.	.	.	.
	[BASIN DEPTH(FEET) =	3.21]					
5.33	0.40 0.05	0.316 OI	.	.	.	.	.
	[BASIN DEPTH(FEET) =	3.24]					
5.47	0.30 0.05	0.318 OI	.	.	.	.	.
	[BASIN DEPTH(FEET) =	3.27]					
5.60	0.30 0.05	0.321 OI	.	.	.	.	.
	[BASIN DEPTH(FEET) =	3.29]					
5.73	0.30 0.05	0.324 OI	.	.	.	.	.
	[BASIN DEPTH(FEET) =	3.31]					
5.87	0.30 0.05	0.327 OI	.	.	.	.	.
	[BASIN DEPTH(FEET) =	3.33]					
6.00	0.30 0.05	0.329 OI	.	.	.	.	.
	[BASIN DEPTH(FEET) =	3.36]					
6.13	0.30 0.05	0.332 OI	.	.	.	.	.
	[BASIN DEPTH(FEET) =	3.38]					
6.27	0.00 0.05	0.332 O	.	.	.	.	.
	[BASIN DEPTH(FEET) =	3.37]					
6.40	0.00 0.05	0.331 O	.	.	.	.	.
	[BASIN DEPTH(FEET) =	3.37]					
6.53	0.00 0.05	0.330 O	.	.	.	.	.
	[BASIN DEPTH(FEET) =	3.36]					
6.67	0.00 0.05	0.330 O	.	.	.	.	.
	[BASIN DEPTH(FEET) =	3.36]					
6.80	0.00 0.05	0.329 O	.	.	.	.	.
	[BASIN DEPTH(FEET) =	3.35]					
6.93	0.00 0.05	0.329 O	.	.	.	.	.
	[BASIN DEPTH(FEET) =	3.35]					
7.07	0.00 0.05	0.328 O	.	.	.	.	.
	[BASIN DEPTH(FEET) =	3.35]					
7.20	0.00 0.05	0.328 O	.	.	.	.	.
	[BASIN DEPTH(FEET) =	3.34]					
7.33	0.00 0.05	0.327 O	.	.	.	.	.
	[BASIN DEPTH(FEET) =	3.34]					
7.47	0.00 0.05	0.326 O	.	.	.	.	.
	[BASIN DEPTH(FEET) =	3.33]					
7.60	0.00 0.05	0.326 O	.	.	.	.	.
	[BASIN DEPTH(FEET) =	3.33]					
7.73	0.00 0.05	0.325 O	.	.	.	.	.
	[BASIN DEPTH(FEET) =	3.32]					
7.87	0.00 0.05	0.325 O	.	.	.	.	.
	[BASIN DEPTH(FEET) =	3.32]					
8.00	0.00 0.05	0.324 O	.	.	.	.	.
	[BASIN DEPTH(FEET) =	3.31]					
8.13	0.00 0.05	0.324 O	.	.	.	.	.
	[BASIN DEPTH(FEET) =	3.31]					
8.27	0.00 0.05	0.323 O	.	.	.	.	.
	[BASIN DEPTH(FEET) =	3.30]					
8.40	0.00 0.05	0.323 O	.	.	.	.	.
	[BASIN DEPTH(FEET) =	3.30]					
8.53	0.00 0.05	0.322 O	.	.	.	.	.
	[BASIN DEPTH(FEET) =	3.30]					
8.67	0.00 0.05	0.321 O	.	.	.	.	.

			VC-WORKS.TXT				
	[BASIN DEPTH(FEET) =	3.29]					
8.80	0.00 0.05	0.321 o	.	.	.	.	.
	[BASIN DEPTH(FEET) =	3.29]					
8.93	0.00 0.05	0.320 o	.	.	.	.	.
	[BASIN DEPTH(FEET) =	3.28]					
9.07	0.00 0.05	0.320 o	.	.	.	.	.
	[BASIN DEPTH(FEET) =	3.28]					
9.20	0.00 0.05	0.319 o	.	.	.	.	.
	[BASIN DEPTH(FEET) =	3.27]					
9.33	0.00 0.05	0.319 o	.	.	.	.	.
	[BASIN DEPTH(FEET) =	3.27]					
9.47	0.00 0.05	0.318 o	.	.	.	.	.
	[BASIN DEPTH(FEET) =	3.26]					
9.60	0.00 0.05	0.318 o	.	.	.	.	.
	[BASIN DEPTH(FEET) =	3.26]					
9.73	0.00 0.05	0.317 o	.	.	.	.	.
	[BASIN DEPTH(FEET) =	3.25]					
9.87	0.00 0.05	0.316 o	.	.	.	.	.
	[BASIN DEPTH(FEET) =	3.25]					
10.00	0.00 0.05	0.316 o	.	.	.	.	.
	[BASIN DEPTH(FEET) =	3.25]					
10.13	0.00 0.05	0.315 o	.	.	.	.	.
	[BASIN DEPTH(FEET) =	3.24]					
10.27	0.00 0.05	0.315 o	.	.	.	.	.
	[BASIN DEPTH(FEET) =	3.24]					
10.40	0.00 0.05	0.314 o	.	.	.	.	.
	[BASIN DEPTH(FEET) =	3.23]					
10.53	0.00 0.05	0.314 o	.	.	.	.	.
	[BASIN DEPTH(FEET) =	3.23]					
10.67	0.00 0.05	0.313 o	.	.	.	.	.
	[BASIN DEPTH(FEET) =	3.22]					
10.80	0.00 0.05	0.313 o	.	.	.	.	.
	[BASIN DEPTH(FEET) =	3.22]					
10.93	0.00 0.05	0.312 o	.	.	.	.	.
	[BASIN DEPTH(FEET) =	3.21]					
11.07	0.00 0.05	0.311 o	.	.	.	.	.
	[BASIN DEPTH(FEET) =	3.21]					
11.20	0.00 0.05	0.311 o	.	.	.	.	.
	[BASIN DEPTH(FEET) =	3.20]					
11.33	0.00 0.05	0.310 o	.	.	.	.	.
	[BASIN DEPTH(FEET) =	3.20]					
11.47	0.00 0.05	0.310 o	.	.	.	.	.
	[BASIN DEPTH(FEET) =	3.20]					
11.60	0.00 0.05	0.309 o	.	.	.	.	.
	[BASIN DEPTH(FEET) =	3.19]					
11.73	0.00 0.05	0.309 o	.	.	.	.	.
	[BASIN DEPTH(FEET) =	3.19]					
11.87	0.00 0.05	0.308 o	.	.	.	.	.
	[BASIN DEPTH(FEET) =	3.18]					
12.00	0.00 0.05	0.308 o	.	.	.	.	.
	[BASIN DEPTH(FEET) =	3.18]					
12.13	0.00 0.05	0.307 o	.	.	.	.	.
	[BASIN DEPTH(FEET) =	3.17]					
12.27	0.00 0.05	0.306 o	.	.	.	.	.
	[BASIN DEPTH(FEET) =	3.17]					
12.40	0.00 0.05	0.306 o	.	.	.	.	.
	[BASIN DEPTH(FEET) =	3.16]					
12.53	0.00 0.05	0.305 o	.	.	.	.	.

				VC-WORKS.TXT			
	[BASIN DEPTH(FEET) =	3.16]					
12.67	0.00 0.05	0.305	O	.	.	.	.
	[BASIN DEPTH(FEET) =	3.15]					
12.80	0.00 0.05	0.304	O	.	.	.	.
	[BASIN DEPTH(FEET) =	3.15]					
12.93	0.00 0.05	0.304	O	.	.	.	.
	[BASIN DEPTH(FEET) =	3.14]					
13.07	0.00 0.05	0.303	O	.	.	.	.
	[BASIN DEPTH(FEET) =	3.14]					
13.20	0.00 0.05	0.303	O	.	.	.	.
	[BASIN DEPTH(FEET) =	3.14]					
13.33	0.00 0.05	0.302	O	.	.	.	.
	[BASIN DEPTH(FEET) =	3.13]					
13.47	0.00 0.05	0.301	O	.	.	.	.
	[BASIN DEPTH(FEET) =	3.13]					
13.60	0.00 0.05	0.301	O	.	.	.	.
	[BASIN DEPTH(FEET) =	3.12]					
13.73	0.00 0.05	0.300	O	.	.	.	.
	[BASIN DEPTH(FEET) =	3.12]					
13.87	0.00 0.05	0.300	O	.	.	.	.
	[BASIN DEPTH(FEET) =	3.11]					
14.00	0.00 0.05	0.299	O	.	.	.	.
	[BASIN DEPTH(FEET) =	3.11]					
14.13	0.00 0.05	0.299	O	.	.	.	.
	[BASIN DEPTH(FEET) =	3.10]					
14.27	0.00 0.05	0.298	O	.	.	.	.
	[BASIN DEPTH(FEET) =	3.10]					
14.40	0.00 0.05	0.298	O	.	.	.	.
	[BASIN DEPTH(FEET) =	3.10]					
14.53	0.00 0.05	0.297	O	.	.	.	.
	[BASIN DEPTH(FEET) =	3.09]					
14.67	0.00 0.05	0.296	O	.	.	.	.
	[BASIN DEPTH(FEET) =	3.09]					
14.80	0.00 0.05	0.296	O	.	.	.	.
	[BASIN DEPTH(FEET) =	3.08]					
14.93	0.00 0.05	0.295	O	.	.	.	.
	[BASIN DEPTH(FEET) =	3.08]					
15.07	0.00 0.05	0.295	O	.	.	.	.
	[BASIN DEPTH(FEET) =	3.07]					
15.20	0.00 0.05	0.294	O	.	.	.	.
	[BASIN DEPTH(FEET) =	3.07]					
15.33	0.00 0.05	0.294	O	.	.	.	.
	[BASIN DEPTH(FEET) =	3.06]					
15.47	0.00 0.05	0.293	O	.	.	.	.
	[BASIN DEPTH(FEET) =	3.06]					
15.60	0.00 0.05	0.293	O	.	.	.	.
	[BASIN DEPTH(FEET) =	3.05]					
15.73	0.00 0.05	0.292	O	.	.	.	.
	[BASIN DEPTH(FEET) =	3.05]					
15.87	0.00 0.05	0.292	O	.	.	.	.
	[BASIN DEPTH(FEET) =	3.05]					
16.00	0.00 0.05	0.291	O	.	.	.	.
	[BASIN DEPTH(FEET) =	3.04]					
16.13	0.00 0.05	0.290	O	.	.	.	.
	[BASIN DEPTH(FEET) =	3.04]					
16.27	0.00 0.05	0.290	O	.	.	.	.
	[BASIN DEPTH(FEET) =	3.03]					
16.40	0.00 0.05	0.289	O	.	.	.	.

				VC-WORKS.TXT			
	[BASIN	DEPTH(FEET) =	3.03]				
16.53	0.00	0.05	0.289 o	.	.	.	.
	[BASIN	DEPTH(FEET) =	3.02]				
16.67	0.00	0.05	0.288 o	.	.	.	.
	[BASIN	DEPTH(FEET) =	3.02]				
16.80	0.00	0.05	0.288 o	.	.	.	.
	[BASIN	DEPTH(FEET) =	3.01]				
16.93	0.00	0.05	0.287 o	.	.	.	.
	[BASIN	DEPTH(FEET) =	3.01]				
17.07	0.00	0.05	0.287 o	.	.	.	.
	[BASIN	DEPTH(FEET) =	3.00]				
17.20	0.00	0.05	0.286 o	.	.	.	.
	[BASIN	DEPTH(FEET) =	3.00]				
17.33	0.00	0.05	0.285 o	.	.	.	.
	[BASIN	DEPTH(FEET) =	3.00]				
17.47	0.00	0.05	0.285 o	.	.	.	.
	[BASIN	DEPTH(FEET) =	2.99]				
17.60	0.00	0.05	0.284 o	.	.	.	.
	[BASIN	DEPTH(FEET) =	2.99]				
17.73	0.00	0.05	0.284 o	.	.	.	.
	[BASIN	DEPTH(FEET) =	2.98]				
17.87	0.00	0.05	0.283 o	.	.	.	.
	[BASIN	DEPTH(FEET) =	2.98]				
18.00	0.00	0.05	0.283 o	.	.	.	.
	[BASIN	DEPTH(FEET) =	2.97]				
18.13	0.00	0.05	0.282 o	.	.	.	.
	[BASIN	DEPTH(FEET) =	2.97]				
18.27	0.00	0.05	0.282 o	.	.	.	.
	[BASIN	DEPTH(FEET) =	2.96]				
18.40	0.00	0.05	0.281 o	.	.	.	.
	[BASIN	DEPTH(FEET) =	2.96]				
18.53	0.00	0.05	0.281 o	.	.	.	.
	[BASIN	DEPTH(FEET) =	2.95]				
18.67	0.00	0.05	0.280 o	.	.	.	.
	[BASIN	DEPTH(FEET) =	2.95]				
18.80	0.00	0.05	0.279 o	.	.	.	.
	[BASIN	DEPTH(FEET) =	2.94]				
18.93	0.00	0.05	0.279 o	.	.	.	.
	[BASIN	DEPTH(FEET) =	2.94]				
19.07	0.00	0.05	0.278 o	.	.	.	.
	[BASIN	DEPTH(FEET) =	2.93]				
19.20	0.00	0.05	0.278 o	.	.	.	.
	[BASIN	DEPTH(FEET) =	2.93]				
19.33	0.00	0.05	0.277 o	.	.	.	.
	[BASIN	DEPTH(FEET) =	2.92]				
19.47	0.00	0.05	0.277 o	.	.	.	.
	[BASIN	DEPTH(FEET) =	2.92]				
19.60	0.00	0.05	0.276 o	.	.	.	.
	[BASIN	DEPTH(FEET) =	2.91]				
19.73	0.00	0.05	0.276 o	.	.	.	.
	[BASIN	DEPTH(FEET) =	2.91]				
19.87	0.00	0.05	0.275 o	.	.	.	.
	[BASIN	DEPTH(FEET) =	2.90]				
20.00	0.00	0.05	0.275 o	.	.	.	.
	[BASIN	DEPTH(FEET) =	2.90]				
20.13	0.00	0.05	0.274 o	.	.	.	.
	[BASIN	DEPTH(FEET) =	2.89]				
20.27	0.00	0.05	0.274 o	.	.	.	.

			VC-WORKS.TXT			
	[BASIN DEPTH(FEET) =	2.89]				
20.40	0.00 0.05	0.273 o	.	.	.	.
	[BASIN DEPTH(FEET) =	2.88]				
20.53	0.00 0.05	0.273 o	.	.	.	.
	[BASIN DEPTH(FEET) =	2.88]				
20.67	0.00 0.05	0.272 o	.	.	.	.
	[BASIN DEPTH(FEET) =	2.88]				
20.80	0.00 0.05	0.271 o	.	.	.	.
	[BASIN DEPTH(FEET) =	2.87]				
20.93	0.00 0.05	0.271 o	.	.	.	.
	[BASIN DEPTH(FEET) =	2.87]				
21.07	0.00 0.05	0.270 o	.	.	.	.
	[BASIN DEPTH(FEET) =	2.86]				
21.20	0.00 0.05	0.270 o	.	.	.	.
	[BASIN DEPTH(FEET) =	2.86]				
21.33	0.00 0.05	0.269 o	.	.	.	.
	[BASIN DEPTH(FEET) =	2.85]				
21.47	0.00 0.05	0.269 o	.	.	.	.
	[BASIN DEPTH(FEET) =	2.85]				
21.60	0.00 0.05	0.268 o	.	.	.	.
	[BASIN DEPTH(FEET) =	2.84]				
21.73	0.00 0.05	0.268 o	.	.	.	.
	[BASIN DEPTH(FEET) =	2.84]				
21.87	0.00 0.05	0.267 o	.	.	.	.
	[BASIN DEPTH(FEET) =	2.83]				
22.00	0.00 0.05	0.267 o	.	.	.	.
	[BASIN DEPTH(FEET) =	2.83]				
22.13	0.00 0.05	0.266 o	.	.	.	.
	[BASIN DEPTH(FEET) =	2.82]				
22.27	0.00 0.05	0.266 o	.	.	.	.
	[BASIN DEPTH(FEET) =	2.82]				
22.40	0.00 0.05	0.265 o	.	.	.	.
	[BASIN DEPTH(FEET) =	2.81]				
22.53	0.00 0.05	0.265 o	.	.	.	.
	[BASIN DEPTH(FEET) =	2.81]				
22.67	0.00 0.05	0.264 o	.	.	.	.
	[BASIN DEPTH(FEET) =	2.81]				
22.80	0.00 0.05	0.264 o	.	.	.	.
	[BASIN DEPTH(FEET) =	2.80]				
22.93	0.00 0.05	0.263 o	.	.	.	.
	[BASIN DEPTH(FEET) =	2.80]				
23.07	0.00 0.05	0.263 o	.	.	.	.
	[BASIN DEPTH(FEET) =	2.79]				
23.20	0.00 0.05	0.262 o	.	.	.	.
	[BASIN DEPTH(FEET) =	2.79]				
23.33	0.00 0.05	0.262 o	.	.	.	.
	[BASIN DEPTH(FEET) =	2.78]				
23.47	0.00 0.05	0.261 o	.	.	.	.
	[BASIN DEPTH(FEET) =	2.78]				
23.60	0.00 0.05	0.261 o	.	.	.	.
	[BASIN DEPTH(FEET) =	2.77]				
23.73	0.00 0.05	0.260 o	.	.	.	.
	[BASIN DEPTH(FEET) =	2.77]				
23.87	0.00 0.05	0.260 o	.	.	.	.
	[BASIN DEPTH(FEET) =	2.76]				
24.00	0.00 0.05	0.259 o	.	.	.	.
	[BASIN DEPTH(FEET) =	2.76]				
24.13	0.00 0.05	0.259 o	.	.	.	.

				VC-WORKS.TXT			
	[BASIN DEPTH(FEET) =	2.76]					
24.27	0.00 0.05	0.258	O	.	.	.	.
	[BASIN DEPTH(FEET) =	2.75]					
24.40	0.00 0.05	0.258	O	.	.	.	.
	[BASIN DEPTH(FEET) =	2.75]					
24.53	0.00 0.05	0.257	O	.	.	.	.
	[BASIN DEPTH(FEET) =	2.74]					
24.67	0.00 0.05	0.257	O	.	.	.	.
	[BASIN DEPTH(FEET) =	2.74]					
24.80	0.00 0.05	0.256	O	.	.	.	.
	[BASIN DEPTH(FEET) =	2.73]					
24.93	0.00 0.05	0.256	O	.	.	.	.
	[BASIN DEPTH(FEET) =	2.73]					
25.07	0.00 0.05	0.255	O	.	.	.	.
	[BASIN DEPTH(FEET) =	2.72]					
25.20	0.00 0.04	0.255	O	.	.	.	.
	[BASIN DEPTH(FEET) =	2.72]					
25.33	0.00 0.04	0.254	O	.	.	.	.
	[BASIN DEPTH(FEET) =	2.72]					
25.47	0.00 0.04	0.254	O	.	.	.	.
	[BASIN DEPTH(FEET) =	2.71]					
25.60	0.00 0.04	0.253	O	.	.	.	.
	[BASIN DEPTH(FEET) =	2.71]					
25.73	0.00 0.04	0.253	O	.	.	.	.
	[BASIN DEPTH(FEET) =	2.70]					
25.87	0.00 0.04	0.252	O	.	.	.	.
	[BASIN DEPTH(FEET) =	2.70]					
26.00	0.00 0.04	0.252	O	.	.	.	.
	[BASIN DEPTH(FEET) =	2.69]					
26.13	0.00 0.04	0.251	O	.	.	.	.
	[BASIN DEPTH(FEET) =	2.69]					
26.27	0.00 0.04	0.251	O	.	.	.	.
	[BASIN DEPTH(FEET) =	2.68]					
26.40	0.00 0.04	0.250	O	.	.	.	.
	[BASIN DEPTH(FEET) =	2.68]					
26.53	0.00 0.04	0.250	O	.	.	.	.
	[BASIN DEPTH(FEET) =	2.68]					
26.67	0.00 0.04	0.249	O	.	.	.	.
	[BASIN DEPTH(FEET) =	2.67]					
26.80	0.00 0.04	0.249	O	.	.	.	.
	[BASIN DEPTH(FEET) =	2.67]					
26.93	0.00 0.04	0.248	O	.	.	.	.
	[BASIN DEPTH(FEET) =	2.66]					
27.07	0.00 0.04	0.248	O	.	.	.	.
	[BASIN DEPTH(FEET) =	2.66]					
27.20	0.00 0.04	0.247	O	.	.	.	.
	[BASIN DEPTH(FEET) =	2.65]					
27.33	0.00 0.04	0.247	O	.	.	.	.
	[BASIN DEPTH(FEET) =	2.65]					
27.47	0.00 0.04	0.246	O	.	.	.	.
	[BASIN DEPTH(FEET) =	2.65]					
27.60	0.00 0.04	0.246	O	.	.	.	.
	[BASIN DEPTH(FEET) =	2.64]					
27.73	0.00 0.04	0.245	O	.	.	.	.
	[BASIN DEPTH(FEET) =	2.64]					
27.87	0.00 0.04	0.245	O	.	.	.	.
	[BASIN DEPTH(FEET) =	2.63]					
28.00	0.00 0.04	0.244	O	.	.	.	.

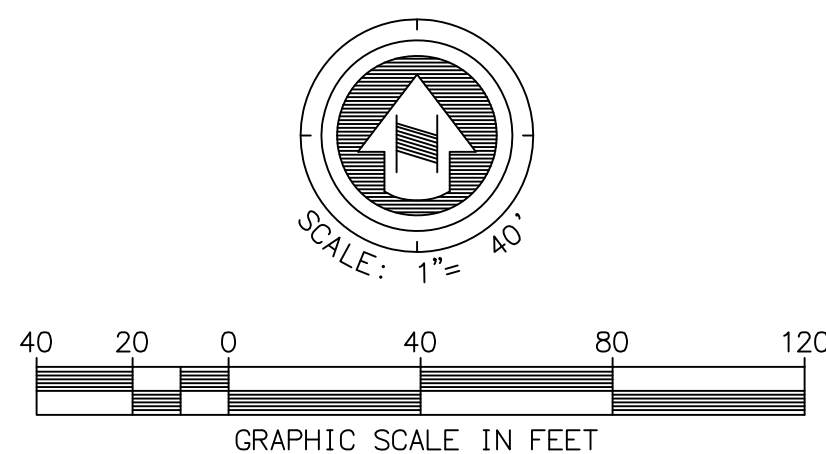
				VC-WORKS.TXT			
	[BASIN DEPTH(FEET) =	2.63]					
28.13	0.00 0.04	0.244 o	.	.	.	.	.
	[BASIN DEPTH(FEET) =	2.62]					
28.27	0.00 0.04	0.243 o	.	.	.	.	.
	[BASIN DEPTH(FEET) =	2.62]					
28.40	0.00 0.04	0.243 o	.	.	.	.	.
	[BASIN DEPTH(FEET) =	2.62]					
28.53	0.00 0.04	0.243 o	.	.	.	.	.
	[BASIN DEPTH(FEET) =	2.61]					
28.67	0.00 0.04	0.242 o	.	.	.	.	.
	[BASIN DEPTH(FEET) =	2.61]					
28.80	0.00 0.04	0.242 o	.	.	.	.	.
	[BASIN DEPTH(FEET) =	2.60]					
28.93	0.00 0.04	0.241 o	.	.	.	.	.
	[BASIN DEPTH(FEET) =	2.60]					
29.07	0.00 0.04	0.241 o	.	.	.	.	.
	[BASIN DEPTH(FEET) =	2.59]					
29.20	0.00 0.04	0.240 o	.	.	.	.	.
	[BASIN DEPTH(FEET) =	2.59]					
29.33	0.00 0.04	0.240 o	.	.	.	.	.
	[BASIN DEPTH(FEET) =	2.59]					
29.47	0.00 0.04	0.239 o	.	.	.	.	.
	[BASIN DEPTH(FEET) =	2.58]					
29.60	0.00 0.04	0.239 o	.	.	.	.	.
	[BASIN DEPTH(FEET) =	2.58]					
29.73	0.00 0.04	0.238 o	.	.	.	.	.
	[BASIN DEPTH(FEET) =	2.57]					
29.87	0.00 0.04	0.238 o	.	.	.	.	.
	[BASIN DEPTH(FEET) =	2.57]					
30.00	0.00 0.04	0.237 o	.	.	.	.	.
	[BASIN DEPTH(FEET) =	2.57]					
30.13	0.00 0.04	0.237 o	.	.	.	.	.
	[BASIN DEPTH(FEET) =	2.56]					
30.27	0.00 0.04	0.236 o	.	.	.	.	.
	[BASIN DEPTH(FEET) =	2.56]					
30.40	0.00 0.04	0.236 o	.	.	.	.	.
	[BASIN DEPTH(FEET) =	2.55]					
30.53	0.00 0.04	0.236 o	.	.	.	.	.
	[BASIN DEPTH(FEET) =	2.55]					
30.67	0.00 0.04	0.235 o	.	.	.	.	.
	[BASIN DEPTH(FEET) =	2.55]					
30.80	0.00 0.04	0.235 o	.	.	.	.	.
	[BASIN DEPTH(FEET) =	2.54]					
30.93	0.00 0.04	0.234 o	.	.	.	.	.
	[BASIN DEPTH(FEET) =	2.54]					
31.07	0.00 0.04	0.234 o	.	.	.	.	.
	[BASIN DEPTH(FEET) =	2.53]					
31.20	0.00 0.04	0.233 o	.	.	.	.	.
	[BASIN DEPTH(FEET) =	2.53]					
31.33	0.00 0.04	0.233 o	.	.	.	.	.
	[BASIN DEPTH(FEET) =	2.52]					
31.47	0.00 0.04	0.232 o	.	.	.	.	.
	[BASIN DEPTH(FEET) =	2.52]					
31.60	0.00 0.04	0.232 o	.	.	.	.	.
	[BASIN DEPTH(FEET) =	2.52]					
31.73	0.00 0.04	0.231 o	.	.	.	.	.
	[BASIN DEPTH(FEET) =	2.51]					
31.87	0.00 0.04	0.231 o	.	.	.	.	.

			VC-WORKS.TXT				
	[BASIN DEPTH(FEET) =	2.51]					
32.00	0.00 0.04	0.230 o		.	.	.	.
	[BASIN DEPTH(FEET) =	2.50]					
32.13	0.00 0.04	0.230 o		.	.	.	.
	[BASIN DEPTH(FEET) =	2.50]					
32.27	0.00 0.04	0.230 o		.	.	.	.
	[BASIN DEPTH(FEET) =	2.50]					
32.40	0.00 0.04	0.229 o		.	.	.	.
	[BASIN DEPTH(FEET) =	2.49]					
32.53	0.00 0.04	0.229 o		.	.	.	.
	[BASIN DEPTH(FEET) =	2.49]					
32.67	0.00 0.04	0.228 o		.	.	.	.
	[BASIN DEPTH(FEET) =	2.48]					
32.80	0.00 0.04	0.228 o		.	.	.	.
	[BASIN DEPTH(FEET) =	2.48]					
32.93	0.00 0.04	0.227 o		.	.	.	.
	[BASIN DEPTH(FEET) =	2.48]					
33.07	0.00 0.04	0.227 o		.	.	.	.
	[BASIN DEPTH(FEET) =	2.47]					
33.20	0.00 0.04	0.226 o		.	.	.	.
	[BASIN DEPTH(FEET) =	2.47]					
33.33	0.00 0.04	0.226 o		.	.	.	.
	[BASIN DEPTH(FEET) =	2.46]					
33.47	0.00 0.04	0.226 o		.	.	.	.
	[BASIN DEPTH(FEET) =	2.46]					
33.60	0.00 0.04	0.225 o		.	.	.	.
	[BASIN DEPTH(FEET) =	2.45]					
33.73	0.00 0.04	0.225 o		.	.	.	.
	[BASIN DEPTH(FEET) =	2.45]					
33.87	0.00 0.04	0.224 o		.	.	.	.
	[BASIN DEPTH(FEET) =	2.45]					
34.00	0.00 0.04	0.224 o		.	.	.	.
	[BASIN DEPTH(FEET) =	2.44]					
34.13	0.00 0.04	0.223 o		.	.	.	.
	[BASIN DEPTH(FEET) =	2.44]					
34.27	0.00 0.04	0.223 o		.	.	.	.
	[BASIN DEPTH(FEET) =	2.43]					
34.40	0.00 0.04	0.222 o		.	.	.	.
	[BASIN DEPTH(FEET) =	2.43]					
34.53	0.00 0.04	0.222 o		.	.	.	.
	[BASIN DEPTH(FEET) =	2.43]					
34.67	0.00 0.04	0.221 o		.	.	.	.
	[BASIN DEPTH(FEET) =	2.42]					
34.80	0.00 0.04	0.221 o		.	.	.	.
	[BASIN DEPTH(FEET) =	2.42]					
34.93	0.00 0.04	0.221 o		.	.	.	.
	[BASIN DEPTH(FEET) =	2.41]					
35.07	0.00 0.04	0.220 o		.	.	.	.
	[BASIN DEPTH(FEET) =	2.41]					
35.20	0.00 0.04	0.220 o		.	.	.	.
	[BASIN DEPTH(FEET) =	2.40]					
35.33	0.00 0.04	0.219 o		.	.	.	.
	[BASIN DEPTH(FEET) =	2.40]					
35.47	0.00 0.04	0.219 o		.	.	.	.
	[BASIN DEPTH(FEET) =	2.40]					
35.60	0.00 0.04	0.218 o		.	.	.	.
	[BASIN DEPTH(FEET) =	2.39]					
35.73	0.00 0.04	0.218 o		.	.	.	.

			VC-WORKS.TXT			
	[BASIN DEPTH(FEET) =	2.39]				
35.87	0.00 0.04	0.217 o	.	.	.	.
	[BASIN DEPTH(FEET) =	2.38]				
36.00	0.00 0.04	0.217 o	.	.	.	.
	[BASIN DEPTH(FEET) =	2.38]				
36.13	0.00 0.04	0.217 o	.	.	.	.
	[BASIN DEPTH(FEET) =	2.38]				
36.27	0.00 0.04	0.216 o	.	.	.	.
	[BASIN DEPTH(FEET) =	2.37]				
36.40	0.00 0.04	0.216 o	.	.	.	.
	[BASIN DEPTH(FEET) =	2.37]				
36.53	0.00 0.04	0.215 o	.	.	.	.
	[BASIN DEPTH(FEET) =	2.36]				
36.67	0.00 0.04	0.215 o	.	.	.	.
	[BASIN DEPTH(FEET) =	2.36]				
36.80	0.00 0.04	0.214 o	.	.	.	.
	[BASIN DEPTH(FEET) =	2.35]				
36.93	0.00 0.04	0.214 o	.	.	.	.
	[BASIN DEPTH(FEET) =	2.35]				
37.07	0.00 0.04	0.213 o	.	.	.	.
	[BASIN DEPTH(FEET) =	2.35]				
37.20	0.00 0.04	0.213 o	.	.	.	.
	[BASIN DEPTH(FEET) =	2.34]				
37.33	0.00 0.04	0.212 o	.	.	.	.
	[BASIN DEPTH(FEET) =	2.34]				
37.47	0.00 0.04	0.212 o	.	.	.	.
	[BASIN DEPTH(FEET) =	2.33]				
37.60	0.00 0.04	0.212 o	.	.	.	.
	[BASIN DEPTH(FEET) =	2.33]				
37.73	0.00 0.04	0.211 o	.	.	.	.
	[BASIN DEPTH(FEET) =	2.33]				
37.87	0.00 0.04	0.211 o	.	.	.	.
	[BASIN DEPTH(FEET) =	2.32]				
38.00	0.00 0.04	0.210 o	.	.	.	.
	[BASIN DEPTH(FEET) =	2.32]				
38.13	0.00 0.04	0.210 o	.	.	.	.
	[BASIN DEPTH(FEET) =	2.31]				
38.27	0.00 0.04	0.209 o	.	.	.	.
	[BASIN DEPTH(FEET) =	2.31]				
38.40	0.00 0.04	0.209 o	.	.	.	.
	[BASIN DEPTH(FEET) =	2.30]				
38.53	0.00 0.04	0.208 o	.	.	.	.
	[BASIN DEPTH(FEET) =	2.30]				
38.67	0.00 0.04	0.208 o	.	.	.	.
	[BASIN DEPTH(FEET) =	2.30]				
38.80	0.00 0.04	0.208 o	.	.	.	.
	[BASIN DEPTH(FEET) =	2.29]				
38.93	0.00 0.04	0.207 o	.	.	.	.
	[BASIN DEPTH(FEET) =	2.29]				
39.07	0.00 0.04	0.207 o	.	.	.	.
	[BASIN DEPTH(FEET) =	2.28]				
39.20	0.00 0.04	0.206 o	.	.	.	.
	[BASIN DEPTH(FEET) =	2.28]				
39.33	0.00 0.04	0.206 o	.	.	.	.
	[BASIN DEPTH(FEET) =	2.28]				
39.47	0.00 0.04	0.205 o	.	.	.	.
	[BASIN DEPTH(FEET) =	2.27]				
39.60	0.00 0.04	0.205 o	.	.	.	.

				VC-WORKS.TXT				
	[BASIN DEPTH(FEET) =	2.27]						
39.73	0.00 0.04	0.204	o	.	.	.	.	.
	[BASIN DEPTH(FEET) =	2.26]						
39.87	0.00 0.04	0.204	o	.	.	.	.	.
	[BASIN DEPTH(FEET) =	2.26]						
40.00	0.00 0.04	0.204	o	.	.	.	.	.
	[BASIN DEPTH(FEET) =	2.25]						

□



### LEGEND

PROPERTY LINE

EXISTING LOT LINE

RIGHT-OF-WAY

EXISTING CONTOUR

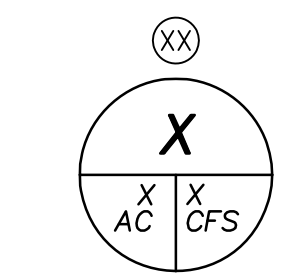
EXISTING STORM DRAIN

BASIN BOUNDARY

FLOW PATH

HYDROLOGY NODE

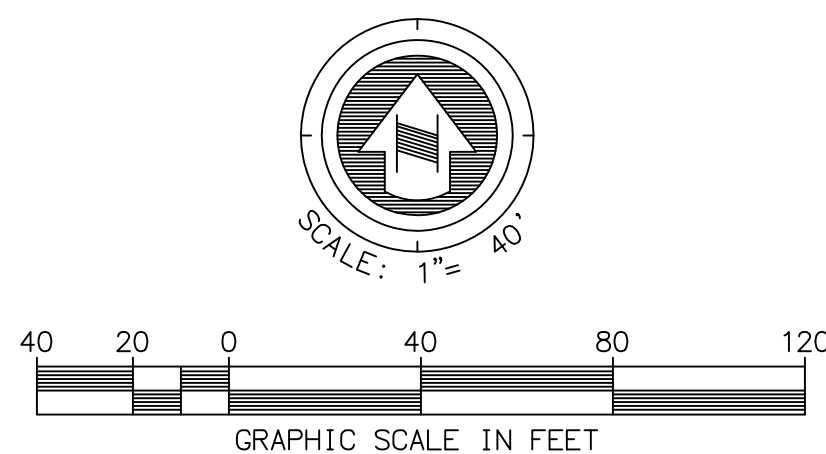
### POINT OF ANALYSIS



RANCHO CIELO PARCEL 'VC'  
EXISTING 100-YEAR HYDROLOGY  
COUNTY OF SAN DIEGO, CA

PROJECT NUMBER: 02711-001-01  
DATE: 3/2/11





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